THE FARMERS' REGISTER.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE ACTION OF GYPSUM AS MANURE.

Big Lick, Botetourt,
May 22d., 1836.

To the Editor of the Farmers' Register.

An intelligent contributor to your first number of the present volume, deduces from his experience in the cultivation of clover, with the aid of plaster, that they are insufficient for the restoration or improvement of worn out lands. From his experiment, it appeared, that through the agency of clover and plaster, the productiveness of his land was materially increased for a few years; but that after the second year, his crops began to deteriorate so much as to induce him to abandon the clover system, and rely upon marsh mud and putrescent manures. This statement of facts is so much at war with the generally received opinion of the effects of clover and gypsum, and so opposed to what I had before considered the well-established theory of plaster, that I felt some curiosity to see how they could be reconciled. The mystery which has heretofore veiled the character of this mineral, when considered as a manure, has been measurably drawn aside by the scientific researches and practical labors of Count Chaptal. Before his genius and erudition and, sound judgment were devoted to agriculture, and excited to the most energetic action by a passionate love for the study, the whole world, learned and unlearned, were entirely ignorant of its *modus operandi*. Some urging, what the experiment of your contributor would seem to prove, that plaster was a powerful stimulant, which excited the land to unnatural production, and having wasted its fertility in a few years, would leave it altogether inert and barren. Others laid great stress on its being an absorbent of moisture, and confined its benefits to periods of drought: whilst others, guided by the feeble lights which science had shed upon the subject, embraced the opinion, that, although its stimulating and absorbent qualities were entitled to some consideration, yet, that its great value consisted in its being soluble, and acting directly as a *pabulum* to the crop. Among those who adopted this theory, and whose reputation gave it the stamp of currency, was Sir Humphry Davy, a philosopher upon whom nature had scattered the rays of genius, and the inspiration of intellect, with a bountiful hand—one whose efforts to improve the science of agriculture, as connected with chemistry, entitles him to our highest admiration and lasting gratitude—and one who, had he been so situated as to have brought his theories to the touchstone of experience, would have shed a flood of light upon the path of the husbandman, which would have cheered him through many a dreary *jungle* of contradictions and difficulties, which perplex and annoy him. From an analysis of the soil in those districts of England, in which plaster is inoperative, he ascertained that they contained a much larger proportion of gypsum than the soil of those where it was beneficially employed. He, likewise, ascertained, from a series of the most carefully conducted experiments, that those plants, upon which the effects of plaster were most striking, contained it in the largest quantities. From which two facts, taken in connection, he inferred that gypsum was an essential constituent in the organization of those vegetables upon which its influence is most discernible; that it was a species of food which was all important to them; that some soils were surcharged with it, and others deficient; that of course in the one case it would be waste to apply it, and in the other, an indispensable auxiliary. Such being the theory of this great man, the whole world seemed to acquiesce in its correctness, until Count Chaptal, profiting by the researches of Sir Humphry, and possessing the incalculable advantage of experience as a practical agriculturist, gave to the world the fruits of a life time spent in the ardent pursuit and patient investigation of agriculture, as a science.

Looking upon his vocation, not only as the most important, but as the most dignified and independent and honorable of all others, and as requiring the exercise of the highest faculties of the human mind, he prosecuted it with a zeal and energy that never wavered; and in the maturity of age and experience, presented the public with a work entitled *Chemistry applied to Agriculture*—a work in which the perspicuity of his mind, and the solidity of his judgment are every where conspicuous—a work in which he seems to thread the intricacies of the science with intuitive sagacity, and to illumine its paths with a torch, which renders them plain and easily travelled by all. In that portion of his book which treats of stimulating manures, he bears testimony to the immeasurable utility and extraordinary efficacy of plaster. He unites with Davy in discarding the idea of its value consisting in its attraction for moisture, for the very plain reason that it solidifies what it absorbs, and of course does not impart it to the plant. He also concurs in the correctness of Davy's experiments, which proved that it was not favorable to decomposition. He attaches no importance to it as a *pabulum*, and thinks that its great virtue resides in its stimulating properties. The fact that it requires 500 parts of water to dissolve one of plaster, thus affording a moderate, constant, and uniform stimulus to vegetation, he considers its most valuable feature. These opinions he deduces from numerous well established analogies, and which, to those who read his work, will seem to follow naturally and inevitably. If, then, Chaptal be not mistaken, your correspondent has certainly erred in inferring from his experiment, that plaster was a mere alterative or stimulant, whose effects weakened the productive powers of his soil after a few years. If he means further to convey the idea that though the land continued to produce clover luxuriantly by the aid of plaster, that the soil was not improved, and the wheat and corn crops deteriorated annually, I must insist that he has mistaken the cause, though I am unable to suggest the true one, without a more intimate knowledge of his

system of farming. According to Chaptal, gypsum acts only as a condiment—a spice to excite the digestive organs of the plant; and clover and corn being among those plants upon which it acts most powerfully, its effects upon the after production of both, should have corresponded. If, moreover, the effect of the stimulus be to make the crop more luxuriant, and thus draw more heavily upon the nutritive principles of the soil, then your correspondent using clover as an alternating crop, would return to the soil an immense addition of vegetable matter—which has been shown, under the four shift system of Shirley, and Westover, under the five, and six, and seven shift systems of Messrs. Craven and Rogers, of Albemarle, and under the infinite variety of systems in which plaster and clover are used in rotation, throughout Pennsylvania, Jersey, New York, along the broad belt of red land at the base of the Blue Ridge, and the coterminous calcareous region of the Valley of Virginia—to be attended with progressive and permanent improvement.

I have amplified, I fear tediously, upon this subject, because I consider the doctrine advanced by your Maryland correspondent, the most dangerous which could gain ground among the desert wastes, which disfigure Eastern Virginia. And because it has already gained foothold with other gentlemen, who, like your intelligent correspondent, have yielded at the first failure, and abandoned, what I am sure, has done more to repair the ravages—the murderous cut-throat system of our fathers—than all other agents united.

Your Charlotte correspondent, J. F. E., tested by the same authorities, would be adjudged equally exceptionable upon this point; and from the sound sense which his remarks respecting putrescent manures indicate, he will probably have as many converts as your Maryland correspondent. If these gentlemen have not read Chaptal's book, I will take the liberty of recommending it to their perusal, in the confidence, that I offer them a rich banquet, where they may regale themselves with pleasure and profit, and in the further confidence, that they will rise from its perusal, advocates of gypsum and clover, and even more zealous than they are now, for putrescent manures. They will think, with the learned Frenchman, "that the use of plaster is one of the most important improvements that has ever been made in agriculture"—"that dunghills are the riches of the fields;" for, "without dung, there is no harvest."

WM. M. PEYTON.

P. S. Chaptal states, in his treatise near the bottom of page 75, that 300 parts of water will dissolve one of gypsum. This differs so materially from Sir Humphry Davy, and other chemists, that I have been induced to suspect that it was an error of the printer; but there being no other passage in the work by which it can be tested, and there being no other copy in the neighborhood, I must beg the favor of you to compare it with yours, and inform me whether they correspond.*

* The figures above referred to are correctly given in our correspondent's copy, (the American translation,) as we have ascertained by examination of the orginal work, (Paris edition.) Chemists differ greatly in their reports of the degree of solubility of gypsum in water.—ED. FAR. REG.

In publishing some hasty remarks, appended to a letter of business, which I addressed you last month, (your polite answer to which, I received as I commenced this sentence,) you committed several typographical blunders, such as "greatly undilating for "gently undulating"—"immediately" for "irremediably," &c., all of which, I have no doubt, are justly chargeable to the indistinctness of my hand writing.

W. M. P.

From the British Farmer's Magazine.

SPADE HUSBANDRY.

SIR,

I beg leave to call the attention of your readers to a recent experiment of spade husbandry in the neighborhood of Eastbourne, which fully proved that digging land is cheaper than ploughing it. Ten surplus laborers petitioned to dig a quantity of land "*at twenty shillings per acre, which is fully equal to three times ploughing, which costs thirty shillings per acre.*" Some of the respectable agriculturists of that neighborhood have made the experiment, and it has also been practiced in Scotland: it will not, therefore, be unreasonable to bope, that, if it be so much cheaper than ploughing, and advantageous in other ways, the practice may become general.

It is admitted by those conversant with the farming business, that it never was in a more depressed state than it is at present; and, consequently, that it needs the utmost economy in expenditure, the most judicious application of labor and skill, and, indeed, every other aid which can be called to its support. It is on this account that I would urge the necessity of every farmer making a trial of the spade, in place of the plough. The experiment is simple, requires no additional study to comprehend it, and its rusults are certain. They may do this without the trouble of analyzing soils, or burdening their memories with a knowledge of chemistry, or laying out large sums in certain profitless pursuits: in fact, by such a course, they may cultivate their farms at a less expense, augment their profits, and improve the condition of their laborers.

If digging were extensively practised, it would furnish employment for thousands of men, able and willing to work, who are now unemployed; and much of that degradation and crime, the concomitants of idleness, which has been manifested amongst the agricultural laborers, would thereby be curtailed. It is ofien the case, too, that the farmer is the sufferer by such crime; for, though he may feel sorry for the wretched men, yet he has not always the means of relief in his power; nor, from the places in which his produce is deposited, is he able to protect it from those who may wish to appropriate it to their own uses. Misfortune often compels men to do what they would shudder at the thought of in opposite circumstances, and it is said that "hunger will break through stone walls;" therefore, they may be tempted to plunder the potato-hog or the barn, to obtain a meal for their starving families; poaching necessarily accompanies such condition; one crime is followed by others o greater magnitude; they thus become amenable to the law; are prosecuted; and their families have to be maintained —still out of the farmer's means. In such a state of things, if any plan can be found which will ben-

efit both the farmer and his servant, it ought to be adopted. Spade husbandry has been tried, and it is asserted that by it the working of the land is better performed, and is much cheaper, than when done by the plough: the farmer could thus give employment to many deserving honest men, and afford them means to rear their families in a comfortable manner. It is, therefore, desirable, that every well meaning man should give his attention to the subject, and endeavor to promote its extension, thus holding out a "helping hand" to those who so much need it. T. C.

From the Genesee Farmer.

ORCHARD GRASS.

Next to the clovers, red and white, herds grass and timothy, the grass that appears best to repay cultivation in the northern states, is the orchard grass of the north, or cocksfoot grass, as it is sometimes called in the middle states. Its valuable qualities consist in its early growth, the rapidity with which it springs up when fed or cut down, the quantity it produces on light soils, and the covering it affords soils which are apt to suffer after mowing from exposure to the sun. When allowed to become old and dry, it does not appear to make as good hay, or be as palatable to horses or other stock, as the first mentioned grasses; indeed, to derive the full benefit of orchard grass, frequent mowing, or constant cropping, is requisite. For a second mowing, or crop of rowen, the orchard grass is unequalled.

Orchard grass is excellent for sowing with clover on all soils, but especially on dry ones, as when mown with the other it springs up so rapidly as to preserve the clover roots from drying up, as they frequently do, and thus prevents the retardation in growth, or death of the plants, that so often ensues. Judge Peters of Pennsylvania, one of the first agriculturists in this country, says, "that on uplands it is preferable to timothy, and that when sown with clover, it endures in uninterrupted vigor and usefulness, when the latter in dry seasons is burned or shriveled." W. H. Johnson, of the same state, and a practical farmer, says—"*As a pasture grass it is without a rival.*" Unlike timothy, or herds, or clover, when cut, its growth is one continued effort of vegetation. The new shoot springs immediately out of the blade, and with such a rapidity that I have known in a rich soil, during eleven or twelve days, an average growth of more than an inch per day. Of all the grasses with which I am acquainted, it is the first to grow in the spring, and continues to flourish the last in the fall. It is soft, sweet and nutritious, and when growing with other grasses, it is observed that stock most generally give it a decided preference.

We have for a number of years been in the habit of cultivating this grass, and can cheerfully add our testimony to the above statement of its good qualities, and would further add, that, as its name imports, it is superior to any other grass for orchards, groves, or fields containing great numbers of shade trees, as under such it flourishes nearly as well as in the open air. The only serious objections we have ever known made to its use were, that by being sown with or without clover, it would form an obstacle to the usual rotation of crops adopted in our wheat growing sections, and that when sown on our lands, it too frequently grew in tufts, rather than in a thick close sward. That it can ever be profitably introduced on lands on which it is intended to raise a crop of wheat as often as once in three years, we do not imagine; in such cases, clover, and nothing but clover, should be used, as on this the fertilizing powers of manure and plaster can be most profitably exerted. But there is on almost every farm, fields that cannot and ought not to be subjected to the rotation system, and here the orchard grass may be invaluable. On farms, too, intended for grazing, the orchard grass will prove a most important auxiliary and one which we think will be more valued and appreciated the more it is used and cultivated. The rapidity with which it throws out new leaves after cutting, is almost incredible, and should be witnessed by all who would understand the vegetative powers of plants. As to its growing in tufts—this is true, as it is generally sown, but the difficulty, we think, lies in not having a sufficient quantity of seed put on an acre. If put on thick enough, it grows no more in tufts than the other grasses, and spreads in the same manner. When thinly sown with timothy or clover, it grows so much more rapidly after cutting than the others, that a field necessarily assumes a tufted appearance; but this produces no injury whatever, and is indeed beneficial to the grasses with which it is associated.

Orchard grass seed should be cut rather early, and carefully dried, as otherwise it is apt to fall out and be lost. Where it is intended to be mown, the seed when ripe may be cut clean with a cradle, and thus secured, and the bottom then cut with a scythe, as usually performed. The seed is quite light, not often weighing more than 14 or 15 pounds to the bushel; and should be sown in still weather, that the action of the winds in unequally scattering it, may be prevented. It has been ascertained that for seed lots, two bushels should be sowed to the acre; and for the scythe or for pasture, the mixture should be one bushel of orchard grass and one of timothy seed, sown either in the spring or fall, and over which should be scattered four quarts of clover seed in the month of March.

G.

TO PREVENT TIMBER FROM ROTTING.

[We have published before an account of this important discovery of Mr. Kyan's, but this is a later and, in some respects, a more explanatory statement. —Ed. Far. Reg.]

From the New Bedford Mercury.

Mr. Lindsey:—If you think the following description of the method of preserving timber from rot, insects and worms, now universally adopted in England, is of importance to the public, you will confer a favor by giving it an insertion.

The writer of this is personally acquainted with the ingenious inventor—has attended the lectures in London on the subject, and is satisfied of the efficacy of his plan.

The material employed by the inventor is corrosive sublimate, long known as a great preservative of animal substances from decay. The timber to be prepared must be placed in a tank or vessel, from 40 to 80 feet long, 4 or 5 feet deep, and about the same width. A solution of the corrosive sublimate is then thrown upon it until covered; the proportion, according to the inventor,

is 1 lb. of corrosive sublimate to 5 gallons of water —but individuals who have tried it, say 1 lb. to 10 gallons of water. Pine plank are saturated in 48 hours. An oak stick, 40 feet long and 1 foot square, requires three weeks—during which time it becomes effectually seasoned, and will not contract or shrink, even on exposure to the highest temperature of a tropical climate. The corrosive sublimate has a strong affinity for the albumen or vegetable juices generally called sap, combines instantaneously with it, and forms a new chemical compound which is solid, insoluble, and will not attract moisture. The efficacy of this invention has been tested in the most extraordinary manner. Pieces of the timber prepared with a solution of the sublimate, and unprepared pieces, the latter well seasoned, were placed in the "*Rotten Pit*," at the King's Dock Yark, Woolwich, in 1828. In 1831, the writer of this was present when they were withdrawn. The prepared timber was perfectly sound—the unprepared, although of the best English oak, was a mass of rot and decayed vegetable matter.

The prepared sticks were left on the ground in the open air six months, and then again placed in the Rotten Pit, with other pieces of well seasoned timber. At the end of two years, the prepared timber was found quite sound—the seasoned very rotten.

The Rotten Pit, at Woolwich Yard, is a cave under ground, 80 feet long by 20 feet, and built by order of government, for the purpose of testing the efficacy of the various proposed nostrums for preserving timber. The pit is lined, top, bottom and sides, with vegetable matter in the worst possible stage of corruption—very damp and full of carbonic acid gas—it is a perfect hot-bed—a candle will not burn it in a minute, so foul is the air of this subterraneous chamber. In fact, no timber, although thoroughly salted, docked, or seasoned, will resist three months the powerful decomposing qualities of the Rotten Pit. The specimens were placed on the bottom of the pit, and half buried in the putrid vegetable matter with which the cave is kept supplied. This experiment seemed so conclusive, that Government immediately paid the inventor £10,000, and advised him to take out a patent. He was ordered to construct tanks at all the Dock Yards, and the government timber was immediately prepared in the above manner. Previous to this, individuals had fitted tanks, and two whalemen were built entirely of timber and plank prepared with the solution. House builders are also using it very generally in London. The sleepers, or foundations for railways—staves for oil casks, canvass, rope, and all vegetable matter, may be preserved by its use. It is found that a cubic foot of oak, will absorb three pints of the liquid, which will cost at the present price of quicksilver, 7½ cents per cubic foot; a mere trifle compared with the immense advantage of having a material not liable to be destroyed by rot, worms, or insects of any kind. The objection urged against this material, is its poisonous nature. But it has been proved, by careful experiment, that corrosive sublimate, when it combines with the sap of wood, forms a compound perfectly insoluble, and quite innocent—in fact, a complete chemical change takes place in the poisonous nature of the mixture by this combination.

The writer has seen experiments tried upon canvass and rope, which were immersed in the solution, and placed four months in a dunghill: the unprepared pieces were destroyed—while the texture of the prepared specimens was not weakened in the slightest degree. Any one can try this by using the above proportions.

Satisfactory accounts have been received by Messrs. B. Rotch and M. Enderby, of London, from the captains of the whale ships constructed at their instance, of timber prepared as above—testifying that the crew were remarkably healthy, although they slept actually in contact with the ceiling plank thus prepared, through all climates and changes of temperature.

It is well known to practical men that salt is not an effectual preservative—as many ships, salted on the stocks, have been found rotten the first voyage —one instance, the Enterprise of Nantucket. The Golconda, of New-Bedford, has had a new windlass three voyages in succession, and the lower masts of ships very quickly decay. These parts of a ship it is impossible to salt. In the British navy, the use of salt has been discontinued, as it is found to corrode the iron rapidly, and it also keeps a ship in a very damp state.

From the Cultivator.

PRESERVING BUTTER.

Believing that butter may be kept sweet and good in our climate, almost any length of time, if properly manfactured, and well taken care of, in order to test the validity of this opinion, we had two pots put down, in June, and the other in August, 1834, more than twenty months ago; and on probing them with a tryer, while penning this article, the butter is found perfectly sweet, and seems to retain most of its original flavor and freshness. We design to send both pots to Boston next fall, with a view of having its mode of manufacture, and method of preservation, judged of by the butter tasters of that notable city.

In the manufacturing process, *no water is permitted to come in contact with the cream or butter*—because it is believed that water, and particularly soft water, dissipates much of the fine flavor that gives to butter its high value. The Orange county dairy women say, " give us good hard water, and we will make good butter"—for the reason, probably, that it abstracts less of the aroma from the butter than soft water. The temperature of the cream may be regulated by cold or hot water put into a tub, in which the churn may be plunged. If the cream is clean. it needs no washing; and if the butter is dirty, water will never clean it.

Nothing but good well pulverized salt is used in preserving the butter; this is *all* mixed, and *all* dissolved, in the mass, before the butter has its second, thorough and final working with the butter ladle, and which is not finished till *all* the buttermilk is expelled.

To avoid all taint from the butter vessels, and the better to exclude it from the air, which soon injures it, the butter is packed close in clean stone jars, and when nearly filled, is covered with a strong brine, rendered pure by previous boiling, skimming and settling. In twenty months this brine has been twice renewed, on the appearance of a film upon the surface of the old pickle. To preserve butter, air and water, and heat above 65

or 70 degrees, are to be guarded against as much as possible. The brine upon the surface does not penetrate the mass, nor while sweet taint it; but it thoroughly excludes the air.

From the New England Farmer.

DEMAND FOR COCOONS.

If farmers have any doubts remaining with respect to the demand for cocoons, or raw silk, they will be removed on seeing markets opening for them in all directions. The manufacturing companies already formed, will require more of the raw material than will be grown in this country for the next quarter of a century. Many of these companies are incorporated for the purpose of growing, as well as manufacturing silk; on account of the necessity which they will be under for years to come, of producing their own stock. This union of both branches of the business is not a matter of choice, but of necessity. The manufacture of silk is a distinct branch of business from its culture, and it would be desirable to keep it so, were it practicable; but until farmers engage in the business with spirit and activity, manufactures must rely on their own resources to furnish their own stock.

From the New England Farmer.

TRANSPLANTING EVERGREENS.

It is generally recommended in transplanting evergreen shrubs and trees, to do it in winter, or when a large frozen ball of earth can be removed with the roots, which prevents any exposure of them to the air, and the necessity of applying new earth to them. But it frequently happens, that circumstances render this method very inconvenient, or impossible. When this is the case, they should be transplanted considerably later in the spring than common deciduous trees. The best time is when the buds are beginning to swell, or when they are passing from a quiescent state to that of active vegetation, as it is then that they are best prepared to supply, by new roots, any loss sustained in their removal.

From the Genesee Farmer.

SPREADING STABLE MANURE.

"I cannot subscribe to the doctrine of hauling out stable manure, and leaving it in heaps until we are ready to plough it under. It will ferment. The sooner it is spread after being disturbed, the better; and from often repeated experiments, my best crops have uniformly been where the dung was spread as fast as it was hauled, though it lay exposed to both sun and rain for some days,—in a few instances for several weeks before it was ploughed under. The same kind of manure which lay in heaps unspread till the day it was plonghed under, produced a very inferior crop. I have not been able to discover that manure when spread abroad ready for the plough, sustains any great loss from evaporation—or at least not so much as from fermentation while lying in heaps after it has been disturbed; for dung undergoes a fresh fermetation every time it is moved and then left in bulk: if it lies spread evenly over the surface however, its strength is carried into the soil by the rains."

The above suggestions appear reasonable; and whether the experience of others will accord with these results or not, we think his suggestions are worthy of careful examination. The experiments can be easily repeated; and we hope that farmers will not prejudge the case, but patiently examine for themselves. Well directed attention to matters, often deemed trivial, like the diligent hand maketh rich.

From the Genesee Farmer.

TWO CROPS AT ONCE ON THE GROUND.

Three years ago, I was persuaded to plant potatoes between the rows of Indian corn. The field had been well dressed with both lime and stable manure, and the ground well cultivated: yet the result was less than half a crop of either corn or potatoes; and my maxim has since been *one crop at a time.* It is all that we can reasonably look for; and so far as my knowledge has extended, every attempt at *double cropping* has ended in disappointment.

THE CONNECTICUT SILK FACTORY.

[So great is the interest at the present time to our country in the culture and manufacture of silk, that almost any thing relating to the subject is sure to attract attention. We doubt not therefore that the following Report will be highly acceptable to our readers. It will be gratifying to the public to learn, that the encouragement afforded by the legislature to this important department of industry, has been attended with such beneficial results; and to our citizens especially it must be a source of pride and satisfaction, that so useful and well regulated an establishment as that described in the report, is located in our city.]—*Con. Courrant.*

The Committee appointed by the "*Hartford County Silk Society,*" to examine into the present condition and progress of "the Connecticut Silk Manufacturing Company," have attended to the duty of said appointment, and submit the following report.

On going into the establishment of said company, the Committee could not avoid expressing their satisfaction at the good order, neatness, and comfort, which every where appeared among its inmates. The weaving room contains about 100 looms, about 60 of which were occupied by neat, industrious looking young ladies, apparently from 12 to 20 years of age, and while their labor, that of weaving a fabric from two to four inches wide, appeared exceedingly light and pleasant, there was a general contentment and satisfaction exhibited in their countenances, or by the singing of some sprightly air.

The charter of the silk company provides that the said company shall instruct one person to be named by each of the county silk societies, in the art and mystery of reeling silk, without expense. But the Committee learned, with great satisfaction, that the President of the Manufacturing Compa-

ny, Mr. Colt, the present director of the establishment, is willing to instruct every one who offers, not only gratuitously, but will pay them a reasonable compensation for their services, to the number of two hundred, at least. It is understood that all applicants shall bring evidence of fair moral character, and that their ages shall not be under 15, nor over 40 years.

As the process of reeling the silk from the cocoons is performed only during the summer, those who apply for instruction in this part of the manufacture only, must of course come at that season of the year. But those who remain through the winter will also be instructed in the art of weaving Tuscan straw, and a variety of other fancy articles.

With respect to the time and labor required to learn the various arts carried on in the establishment, the Committee saw two young ladies who had been only a day or two at work, and were surprised at the facility with which they produced the finest fabrics.

The prices paid per yard for the fabrics, depend upon the ease, or difficulty, with which they are produced, so that with equal industry there is but little difference in their earnings. On inspecting the day book, the Committee found that 50 cents per day is nearly the average sum paid those who had been in the factory for a few weeks.

It is the wish and desire of the Silk Company that the farmers should raise the silk, their daughters reel it, and sell it in the raw state to the manufacturer. After the art of reeling has been acquired, the Committee see no difficulty in this arrangement, since the reel is a very simple and cheap instrument, and may be had of the company at five dollars each, and requires no more room or skill to keep it in order than the common household reel, so universally in use.

The Committee would therefore recommend that every farmer who raises only a few bushels of cocoons should have them reeled in his own house. This will be found by far the most profitable method, since the difference of price between the cocoons and the reeled silk will much more than pay for the reeling. This difference is so considerable, that even when the farmer raises only a few pounds of silk, the expenses of a reel would every year be saved by having the reeling done in his family.

The chief business of the Silk Company at the present time is the manufacture of Tuscan straw into fabrics for hats and bonnets; and the Committee were particularly interested in some estimates which the president of the company had made on this manufacture in a national point of view. If we suppose there are three millions of females in the United Ststes, who purchase each a Tuscan hat annually, at the price of two dollars, then the cost of this single article to the country will amount to 6 millions per year. Taking the last three or four years as examples, it is thought that this estimate is not far from the truth, for it is known that there are upwards of 6 millions of females in our country, and we think that common observation is sufficient to show, that, in the Atlantic States at least, one-half of them have worn Tuscan hats within the last year or two; and judging from the known contagious nature of female fashions, we may fairly conclude that a similar estimate may be made with respect to the interior states. But since it takes two or three years for a fashion to pass from one end of our country to the other, it may be objected that our estimate is too high, as not all the females who wear Tuscan hats purchase them in the same year. But it must be remembered that two dollars is probably behind the average price of the article in question, and that the more common price has been from five to ten dollars. It must also be remembered that our estimate with respect to the number of females who wear Tuscan hats is probably much below the truth, so that we believe our estimate cannot be far out of the way.

Now taking for data certain facts presented by the Silk Company, the Committee are warranted in believing that the three millions of dollars, expended for the article in question, may all be earned by the females in this country.

In behalf of the Committee,

J. L. COMSTOCK.

EXPLANATORY REMARKS ON THE ACTION OF CHEMISTRY ON AGRICULTURE.

By JAMES RENWICK, LL. D. Professor of Nat. Exp. Philosophy and Chemistry in Columbia College, N. Y.

[A public-spirited agriculturist, in the western part of the State of New York, who is ready to devote a portion of his wealth, as well as the energies of his mind, for his country's improvement, some months ago asked our leave to have re-published, for distribution in New York, the translation of Puvis' *Essay on the use of Lime as Manure*, which was prepared for, and first appeared in this journal. Of course, the permission was most readily accorded. Professor Renwick consented to carry the plan into effect: and this second edition of the translation has recently been published in a neat octavo pamphlet, and is preceded by the introduction, which will be inserted below. This piece is especially valuable as applying chemical science to agriculture, in popular and perspicuous language, according to its author's design, and suitable to the object of the publication, and the class of readers it was particularly intended to benefit; a most desirable and important matter, which is too generally neglected, if not contemned, by other men of science. But though a proper "introduction" to the work of Puvis, this is also a distinct, substantive essay, entirely fit to be presented alone, as it will be given here, and to furnish instruction to all who need it, on the elements of agricultural chemistry.]

The chemical facts and principles which are applicable to agriculture are neither numerous nor complex. They are, however, to be found only in works on general chemistry, in which they are intimately associated with laws and phenomena of a more abstruse description, and in connexion with which they constitute a science of which the most learned are still students, and to attain which in its existing form, may require years of close and attentive study. The language, too, of chemistry, which, to those who study it in a regular course, serves as an artificial memory, and single words of which call up long trains of thought and experiment, presents to the uninitiated all the difficulties of a foreign tongue.

Yet it cannot be doubted, that the practical farmer may derive important benefit from acquiring so much of this language, as will enable him to understand the chemical explanation of the numerous changes which are continually taking place in the natural actions which it is his high privilege to call into his service, to direct in part, and modify in degree. So also are there certain chemical elements and compounds, with the properties of which he ought to be acquainted if he wish to be able to direct his practical skill with more effect, even in circumstances familiar to him, but which may be absolutely necessary, or will at any rate save waste of labor and loss of time, when the knowledge acquired by practice, in one place, is to be employed in a new situation, and under a change of circumstances.

It is the object of this introduction to exhibit, in such form as may be intelligible to those who have not made general chemistry an object of study, a concise view of such of the laws and facts of that science, as are absolutely necessary for the agriculturist who may wish to improve his practice, and which are more particularly required by those who wish to avail themselves of the knowledge contained in the subjoined essay. To do this has been found no easy task. It would be in itself difficult, but to the author of this introduction has been more particularly so, as he has for years been in the habit of imparting instruction to those whose habits of life and thoughts are as remote as posssible from those of the practical farmer; persons to whom the particular language of chemistry is an aid, instead of an impediment; and who, with ample time at their command, have an opportunity of pursuing the study of the science, step by step. Fully aware of these difficulties, both general and peculiar, this attempt would not have been made, and certainly not persisted in, had it not have been for the instances of an intelligent, scientific, and successful farmer, who has urged the completion of the task as an object likely to be beneficial to those, who, with perhaps equal zeal and native powers of mind, have not enjoyed, like himself, the advantages of a scientific education.

The atmosphere which surrounds our earth is the first object to which our attention should be directed. This is the vehicle of the moisture, which, whether it fall in the form of rain or dew, run in streams, or issue from springs, is absolutely essential to the success of the farmer's labor. It is also, as we shall presently see, important to him on other accounts.

The greater part of the atmosphere is made up of a mixture of substances, each of which has the same mechanical properties as the whole mass. These air-like substances are known to chemists by the name of *gases*.

Of these gases, two make up by far the greater portion of atmospheric air, and exist in it in the proportion of about four to one. That which is the largest in quantity, and makes up nearly four-fifths of the whole atmosphere, is called in the Essay of M. Puvis, by the name of Azot, but is more usually known in English by the name of nitrogen.

This substance, although in the largest proportion, is the least important of the gases in its chemical effects. It does not aid in supporting the life of animals, nor in maintaining the burning *(combustion)* of inflammable bodies.

The part of the atmosphere which is absolutely necessary for these purposes, is called by the name of *oxygen*, and nearly makes up the remaining fifth part of the atmospheric air. In its support of life, it always, and in maintaining combustion often, unites with a chemical element, which is called *carbon*. This is familiarly known as forming the principal part of charcoal. In its union with carbon, oxygen forms a peculiar gas known by the name of carbonic acid.

Carbonic acid is always found in small quantities in the atmosphere, to which it is furnished by the breath of animals and the fumes of burning bodies. It is, when in considerable quantities, fatal to the life of animals, but is prevented from accumulating to an injurious extent, in consequence of its being taken up by water; it is therefore dissolved, in proportions about equal to those in which it is formed, by rivers, lakes, the ocean, and the moisture of the soil.

Water exists in the atmosphere in the form of vapor. The great source of this vapor is the extended surface of the ocean; and it is governed by a mechanical law, by which it is continually tending to distribute itself uniformly over the whole surface of the earth. It may thus exist in as large quantities over the surface of the dryest land as over that of the ocean itself. This tendency to equal distribution is continually counteracted by the changes in the sensible heat *(temperature)* of the atmosphere, and of the surface of the earth, which follow the alternations of day and night, and the vicissitudes of the seasons. By these alternations and changes, the vapor is caused to fall *(precipitated)* in the form of rain, snow, hail, dew, or white frost, according to circumstances. As such changes of temperature are more frequent on the land than on the ocean, the water which falls on the former, in either of these forms, is greater in quantity than that which falls on equal surfaces of the latter. Thus, by a wise and benevolent provision of Providence, the water of the ocean is continually furnishing vapor, which is precipitated on the land for the support of vegetation and the supply of springs, and whose excess is poured back into the ocean in streams and rivers.

Water has been found by chemists to be a compound substance, made up of two elements. One of these, which forms eight-ninths of its weight, is the gas already mentioned under the name of oxygen; the other, a peculiar gas, known by the name of *hydrogen*.

Hydrogen, when free, is the lightest of all known bodies, rising and floating in atmospheric air; it not only combines with oxygen, to form water; but with carbon to form a great variety of compounds—gaseous, liquid, viscid, and solid. It also combines with nitrogen, and forms a gas known by the name of ammonia, which is well known by the peculiar smell it gives to spirits of hartshorn *(liquid ammonia.)*

Hydrogen also combines with sulphur, forming a gas known by the name of sulphuretted hydrogen; this exists in the atmosphere, but in such small quantities as only to be detected by the nicest chemical tests. It combines in like manner with phosphorus, forming phosphoretted hydrogen gas, whose presence in the air is occasionally perceptible.

Oxygen, as we have seen, unites with carbon

to form a gas which we have called carbonic acid.

This receives the latter part of its name from its similarity in properties to an extensive class of compound bodies, known by the name of *The Acids*. The greater part of these, like carbonic acid, are combinations of inflammable bodies with oxygen. The most important of these, in reference to our present object, are the sulphuric and phosphoric acids; named from the two substances (sulphur and phosphorus) which are their bases. Muriatic acid may also be mentioned here, although its composition is of a different character. Oxygen unites with other bodies to form a class of compounds known under the name of oxides.

The acids unite with earths, alkalis, and metallic oxides, to form a class of compounds known under the general name of salts. These are named from the two substances which enter into their composition: thus, the salt formed of sulphuric acid and the earth lime, is called sulphate of lime. The substances which unite with acids to form salts, are called the *bases* of the respective salts.

Of these bases, the alkalis and earths are the most important. Of the alkalis, it is only necessary to know the names of two, namely *potassa* and *soda*, and to be aware that their distinctive properties, are—to possess an acrid taste, a caustic operation, to render oils capable of mixing with water, and to neutralize the properties of acids.

The earth which chemists call by the name of silex or *silica*, is found almost pure in flint and rock crystal; it is also almost pure in sharp colorless sands, and is by far the larger part of sands of every description. So far as the farmer need know its properties, it is hard, rough to the touch, has no attraction for water, which it permits to filter through, or evaporate from it, with the greatest ease. It is capable of uniting with the other earths in compounds which are called silicates, and is the only earth which enters into the formation of soils uncombined with the others or with other elements.

The earth which chemists call by the name of *alumina*, is so named because it is obtained by them in a pure form from the well-known salt called alum, of which it is the basis. Its most marked characteristic is plasticity: that is to say, it may be formed into a paste with water, will then easily receive any form which may be given it, and retain that form unaltered, even by violent heat. It never exists in soils unmixed, but in intimate association, or more probably chemical combination with silica, it is the well-known substance called clay, or argillaceous earth. White clays are this combination nearly pure, and colored clays often contain it with no other addition than metallic coloring matter. Clay retains the plastic property of alumina; it therefore causes soils to be retentive of moisture; and, when they dry, makes them form tough clods or crusts, similar in character to sun-dried brick.

Soils which contain clay are often also mixed with sand, or with an excess of silica in grains, which does not enter into composition of the clay. Such a soil is less liable to form a tough crust than a pure clay, but it will require a very large proportion of sand to destroy this property altogether.

Clay mixed with sandy soils renders them more retentive of moisture. Sand and clay have therefore been used as manures for each other; but it may reasonably be doubted whether all the advantage that has been anticipated by some from this process, can be realized, as such a mixture will be merely mechanical.

Loamy soils are generally said to be mixtures of sand and clay; they undoubtedly usually contain both these earths, and even sometimes a large excess of sand. But we shall give reasons for believing that loams owe their peculiar value to a combination of clay with another substance, by which a change is produced in its chemical characters.

Lime is familarly known to farmers by the same name that is generally used by chemists. It is obtained by the aid of heat from rocks which go by the name of limestones. These are combinations of lime with carbonic acid, which is fixed in them by chemical attraction, but which, when driven off by heat, takes the same form as the air of the atmosphere, or becomes a gas. This gas from this circumstance has been called *fixed air*, by which name it is often known when causing the sparkling and froth of cider and beer. The principal part of limestone is therefore called by chemists *carbonate of lime*. Carbonate of lime is also found in shells, both of those of living animals, and those which exist in the ground in a fossil state. In the former it is mixed with animal matter, which is more or less separated from the latter according to the time which has elapsed since the death of the shell fish.

Marl, in the sense in which the term is used by chemists, is a mixture of clay with carbonate of lime. The English writers on agriculture have not observed this distinction, and the term is sometimes applied by them to a decomposed chalk, which may contain little or no clay; and sometimes to clay which contains no carbonate of lime. In fact, the name is frequently applied by them to any earthy matter found below the vegetable soil, which is capable of increasing its fertility. From this misapprehension, the substances which go by the name of marl in New Jersey, Maryland, and Virginia, do not correspond with the chemical definition, but are generally beds of fossil shells, mixed in various proportions with earthy and saline matters of various kinds.

Lime is a substance very different in its characters from the two earths of which we have previously spoken. When prepared by heat from any of the original forms of its carbonate, it retains their shape unaltered, but may have its color changed, and always loses considerably in weight. It is now acrid, caustic, and corrosive, and has some properties in common with potash, which are therefore alkaline. Of these the most important is, that it unites with acids to form compounds included in the general class of salts. Of the salts of lime which are important to the farmer, the three principal are—the *carbonate*, which, as we have stated, is found in limestone, chalk, shells, and marl; the *sulphate*, in which lime is combined with sulphuric acid, and which, in combination with water, is the substance so well known to our farmers under the name of plaster of Paris, or less familiarly by that of gypsum; the *phosphate*, which constitutes a large part of the bones of animals.

Lime when exposed to the air, attracts carbonic acid, which is always to be found in the atmosphere; it thus passes back to the state of carbonate, but in so doing gradually falls to powder, and is then said to be *air-slaked.* If slaked with water, it also falls to a powder, which still retains the caustic character of the burnt lime; but this powder, when exposed to the air, unites with carbonic acid more rapidly than when in mass.

Lime, in its caustic state, has the property of rapidly decomposing vegetable and animal substances, thus hastening the natural processes by which they are finally destroyed; or, to speak more properly, have their elements resolved into new combinations. The offensive and unwholesome gases, which are given out by this composition, are absorbed by the lime, and prevented from mixing with the air. The same property is possessed in a less degree by the carbonate of lime, and probably by its other compounds; but in order that either this earth or its compounds shall manifest this property, they must be in small fragments, or, which is better, in fine powder.

Wet sand and plastic clay, and those soils to which they give their characters, also possess the property of absorbing gases; but they have this in a very inferior degree to lime and its compounds. As the gases generated by the decomposition of vegetable and animal substances form a large part of the necessary food of plants, it is obvious that a soil which contains the carbonate of lime, may retain and store them up for use, while they will be lost in soils of a different character.

Carbonate of lime may also be made a most important article in the preservation of the most valuable parts of putrescent manures, until they can be applied to the soil. In this way marl is applied to a great extent in China; the night soil of their numerous population is there formed into cakes like bricks, with marl, and thus loses its offensive smell; but when these are applied as manure to the land, they give out the gases again, as they are required, for the nourishment of plants. So also in Norfolk, the site for dunghills is prepared by a layer of marl, which is incorporated with the manure from time to time, and retains the gases which would be otherwise lost.

Lime may therefore be applied in its caustic form in some cases in agriculture, for it will hasten the decomposition of animal and vegetable matters which might otherwise be inert; it will also neutralize acids, which experieneed farmers well know to exist in many soils, which they in consequence call sour. But the latter purpose will be answered as well by the carbonate of lime, which may be applied as it exists in marl or shells, or as it may be prepared by grinding limestone. Caustic lime is also dangerous in its application, for it will corrode and destroy living vegetables, and hasten the decomposition of the vegetable matter of the soil to such a degree as to injure its fertility. Except upon turf-bogs, and land loaded with timber not wholly decomposed, quick or caustic lime ought not to be used; but to burn lime, and then by slaking to reduce it to the form of fine powder, which is speedily carbonated by exposure to the air, is a more ready, and generally a cheaper mode of obtaining the carbonate in a convenient form, than to grind limestone to powder in mills. Yet for many of the most valuable uses of lime in agriculture, the latter method, if as cheap, would answer as well.

Lime slowly combines with the earth silica, and produces a compound very different in character from either. It is this, to cite a fact in proof of our statement. which gives the hardness and solidity to ancient mortar. The carbonate of lime will serve to form this compound; and thus, when it has had time to act upon sand, it renders a silicious soil more retentive of moisture; while if applied to clay, by combining with its silicious matter, it renders it more friable; and it is to the formation of this compound by slow degrees, that we are inclined to ascribe the valuable mechanical properties of loamy soils, and the gradual amelioration produced by the use of lime, marl, and shells as manure.

Besides silica, alumina, and lime, an earth called magnesia is likewise found in some soils. It is also, in the form of carbonate, a frequent constituent of limestones. This earth has many properties in common with lime; like lime it is capable of neutralizing acids; and when deprived of carbonic acid by heat, corrodes vegetable substances. It probably also hastens putrefaction, and both it and its carbonate are capable of absorbing the gases let loose in that natural process. It is, however, of little interest in agriculture, except as a part of some of the limestones which are used as manure. These, if applied in large quantities, are sometimes very injurious to vegetation; the reason of this is, that magnesia does not repass to the state of carbonate as rapidly as lime, and therefore retains its corrosive quality long after the lime has again become mild by its union with carbonic acid. In less quantities, however, the magnesian limestones may serve as a manure, but their application requires great caution, particularly when the quantity of magnesia amounts to 25 per cent.

All of the simple substances we have mentioned, except perhaps the last, either separate or in various states of combination, exist in plants. The manner and character of the combination is influenced by the vital action of the plant, which causes them to form compounds, often in direct opposition to the manner in which the ordinary laws of chemistry would direct. It thus happens that so soon as the plant ceases to live, these chemical laws, being no longer impeded, begin to exert their influence; and if it be in such a state as will admit of the several elements acting readily upon each other, a decomposition, more or less rapid, of the vegetable structure ensues. It is a law of chemistry, that its action is always aided by the bodies being in a fluid state; and the action is often impossible when the bodies are perfectly free from moisture. Hence the direct chemical action, and consequent decomposition, takes place with greater certainty and more rapidity in green juicy and succulent vegetables, than upon those which have been deprived of moisture either naturally or artificially. Thus grass, if heaped up in a recent state, decomposes, and if but partially dried, is heated, and may even take fire, by the chemical action of its elements; while, if dried by exposure to the sun and air, and then laid up in a dry place in the form of hay, it is almost indestructible. A moderate degree of heat and access to air are also necessary to promote the chemical action by which decomposition is effected. This decomposition is often attended with motion among the parts; and always, if the mass has a liquid form, as in the expressed juice of vegetables, or in the

steeps employed by distillers and brewers; it goes in general terms by the name of fermentation. When the vegetable matter abounds in starch, the first change is the conversion of this principle into sugar. Sugar, if thus formed, is next converted into alcohol; as it is, if it previously existed in the plant. The presence of alcohol gives the liquid in which it exists the character of vinous liquors, and if these are permitted to remain in a turbid state, a farther fermentation converts them into vinegar; and finally vinegar is farther decomposed, and the vegetable matter, giving out an offensive smell, is said to putrefy. If the substance be not an expressed juice, or liquid steep, these several stages of fermentation ensue with rapidity, may be going on at the same time, and are sometimes so speedy in their course, that no other action but the putrefactive fermentation can be detected. Animal bodies are subject to the same laws, and go through the same stages of fermentation, but the rapidity which they run into putrefaction is even greater; still there are some cases, as in that of milk, where the vinous stage can be occasionally, and the acetic distinctly, observed. Thus, a vinous liquor is prepared in some countries from milk, and the sour taste which appears in it when kept, arises from the presence of vinegar.

In the several stages of fermentation, parts of the vegetable assume the form of gas or vapor, and are giv n out to the air. The gases which have been detected, are carbonic acid, a gaseous compound of carbon and hydrogen, and in some instances ammonia. The vapor is that of water, which escapes in greater quantities than it would under ordinary circumstances, in consequence of the heat with which the process is attended. If exposed to rain, soluble salts, with earthy and alkaline bases, are washed from the mass. Finally, a mass of earthy consistence alone remains, which on examination is found to be made up of earths, insoluble salts, and carbon, being, in fact, identical with vegetable mould.

We may hence infer that the following elements exist in vegetable bodies:

1. Oxygen, developed in the carbonic acid and water.
2. Hydrogen is in the water and carburets of hydrogen.
3. Carbon.
4. Earths.
5. Alkalis.
6. Nitrogen, occasionally developed in the form of ammonia.
7. Acids, remaining in the insoluble, or washed away in the soluble salts.

The chemical examination of vegetable bodies ought of course to lead to similar results. This examination has been conducted in three different ways.

1. With the view of discovering the nature of the compounds, called vegetable principles, which exist ready formed in plants.
2. For the purpose of discovering the chemical elements contained in these principles.
3. By the destructive action of heat, under which some of the elements are wholly separated, and others enter into new combinations.

In the first of these methods there have been detected:

I. Certain peculiar acids, of which we may cite
   (1) Acetic acid, which, mixed with water, forms common vinegar;
   (2) Citric acid, which is found in the lemon and orange;
   (3) Malic acid, which exists in the apple;
   (4) Tartaric acid, in the juice of the grape;
   (5) Oxalic acid in the wild sorrel.

II. Certain substances of alkaline character, found principally in medicinal plants, to which they give their peculiar virtues.

III. Gum, resin, oils, sugar, starch, and two substances approaching to animal matter in their characters, namely, albumen and gluten; the former of these has a resemblance to the white of eggs, the latter to animal jelly or glue.

Many other principles are separated by the same method in different plants, but need not be enumerated by us.

The basis of this method consists in acting upon vegetables by water, ether, or rectified spirits (alcohol,) and the principles above enumerated are either simply, or in the state of combination in which they exist in plants, soluble in at least one of the liquids we have named.

In all cases some insoluble matter is left, and this is known by the name of the woody fibre.

When these principles are treated by the second method, oxygen, hydrogen, and carbon, are the uniform results, but in different proportions in the different cases; nitrogen is also detected in some of them, as, for instance, in the alkaline principles, and in gluten. This method does not appear to be adequate to determine whether earths and alkalis are, or are not, parts of these vegetable principles. From the very remarkable fact, that some of those substances, which are very dissimilar to each other, yield exactly the same proportions of oxygen, hydrogen, and carbon, we may fairly conclude by chemical analogy, that one or the other, or perhaps both, contain some substances which have escaped the analysis. As an instance, we may cite starch and sugar, whose characters are so dissimilar that no danger can exist of mistaking the one for the other; and yet their analysis by the second method gives identical results.

The third method may be understood by comparing it with the process used in making charcoal. If this be so far altered that the heat employed shall not arise from the combustion of a part of the substance to be examined, but from one merely used as fuel, and if the matters which escape in smoke are condensed and collected, we shall have that employed occasionally on a large scale by operative chemists. In this way, coarcoal will be, as usual, obtained in the solid form. The condensible products will be water, tar, turpentine, or resin; and the acid which gives that character to vinegar, but which, in the present case, in union with the tar and water, is called pyroligneous acid.

If the charcoal be burnt in a current of air, all its carbon is converted, by union with the oxygen of the atmosphere, into carbonic acid, leaving a residue familiarly known as ashes. The ashes are made up partly of soluble and partly of insoluble matter. The soluble matter is separated by the familiar process of making ley, and the ley, if evaporated, leaves the solid substance so well known as potash.

Potash is principally composed of a carbonate of potassa, but contains, besides, silica, rendered soluble by the alkali, sulphate and muriate of potassa, and a peculiar acid known by the name of ulmic, which is a compound of carbon, hydrogen, and oxygen. The insoluble part is made up of carbonate of lime, sulphate and sometimes phosphate of lime, silica. The carbonate of lime has probably in no case existed in the living plant, but arises from the destruction by heat of the peculiar acid of the plant; as, for instance, the citric, the oxalic, or the tartaric; all of which are by fire converted into carbonic acid.

The quantity of ashes is extremely various, as is their proportion of the several soluble and insoluble substances, we have mentioned. Thus the ashes of the stalk of Indian corn yield 12½ per cent. of ashes, while the soft woods do not furnish more than two parts in a thousand. The proportion of the sulphate and phosphate of lime is even more various. Thus, in some cases the presence of the sulphate is hardly perceptible, while of the ashes of clover it forms a large proportion of the whole weight. Phosphate of lime is found in the proportion of fifteen per cent. in the grain of wheat.

Water is not only one of the principal component parts of all plants, but is also the sole vehicle of their nutriment. At each extremity of the small fibres into which the roots of plants are divided, is an opening through which that fluid enters; and it appears that, except in the case of a plant having lost its vigour by continued drought, it is only through this channel that water can enter. By a powerful action inherent in living vegetables, water, which, with all the matters it is capable of holding in solution, becomes the sap,* is raised to the highest parts of the plants, and forced to their most distant extremities. It has been ascertained that plants do not possess the power of rejecting even those substances which are most noxious to them; it is therefore probable, that the character of the fluid admitted, is the same in all the plants which grow upon the same soil. Whether it undergoes any change in the root does not appear certain; but it has recently been maintained that every description of plant throws off by the surface of its roots such matter as, if retained, would be injurious; but this opinion does not appear to be well established.

The sap, when carried up to the leaves, undergoes an important change; principally owing to the action of solar light. When exposed to light, the leaves of plants give out oxygen in considerable quantities. This proceeds from a decomposition of the water und carbonic acid, the remaining elements of which two substances, and a portion of their oxygen, enter into new combinations. These combinations have different characters in different vegetables, but are most familiarly known in the shape of gum and resin. Tbese still contain the earthy and saline matter carried up by the sap, and after they are formed, return downwards towards the roots. In their descent they deposite the several parts which minister to the growth of the plant—the leaves, the bark, and the woody fibre. They also appear to be forced with powerful energy into the flower and the growing fruit, and in these a still more important action is carried forward, by which the reproduction of the species is ensured.

* See Roget's Bridgewater Treatise.

The matters which the water that enters by the root may hold in solution, are either derived from the atmosphere or from the soil. In its passage through the air it will carry with it a considerable proportion of carbonic acid, and all the sulphuretted hydrogen it meets with. It will also take up a small quantity of oxygen, and of carburetted hydrogen, and a still less quantity of nitrogen. From the soil it will take all the more soluble salts, small quantities of sulphate, phosphate, and carbonate of lime, provided they be present, and silica. So also if the soil contain animal matter, or vegetables of which nitrogen forms a part, the ammonia generated by their decomposition will likewise be dissolved by the water. In like manner the carbonic acid, which has arisen from the decomposition of vegetable or animal matter, and has not yet escaped, and the soluble compounds of carbon, oxygen, and hydrogen, which are generated by the same process, will have been taken up, and carried by the water into the root of the plant. It will thus appear that, contrary to the opinion of Mr. Puvis, the atmosphere furnishes but little of the fixed elements of plants, with the exception of sulphur and carbon; and that even if the growth of plants were to depend wholly upon the carbon obtained in the form of carbonic acid from the atmosphere, their growth must be slow and feeble. It will also appear, that if lime do not exist in the soil, but few plants can find nourishment; and that for the ripening of the seeds of grain, phosphorus must be furnished also. The latter substance may be absorbed in small quantities from the phosphuretted hydrogen, which is occasionally present in the atmosphere; but a more certain supply ought to be sought in putrescent manure, and particularly in that of animal origin.

The uses of lime in agriculture, as will appear from the foregoing remarks and the reasoning of the essay, are as follows:

1. When a soil contains inert animal or vegetable matter, their decomposition may be promoted, and it may be rendered fit for the food of plants, by the addition of caustic lime.

2. If the soil contain acid, that may be neutralized either by caustic or carbonated lime, and besides, the organic matter whose decomposition may have been prevented by the acid, will be permitted to putrefy.

3. Soils containing too much silica, or in other words those which are sandy, are made more retentive of moisture by the addition of lime or its carbonate.

4. Clays, may be rendered less retentive of moisture, and more friable by the same means.

5. The gases which escape when vegetable or animal matter putrefy, are retained in the soil by means of lime or its carbonate; and thus a given quantity of manure, or the original vegetable matter of the soil, will retain its efficacy longer. By a recent discovery, it has also been ascertained that the decomposition of plants yields a peculiar acid, called the humic, which forms with lime a salt sparingly soluble in water. The generation of this salt also serves to render the nutriment contained in the soil more lasting.

6. Lime and its oompounds are absolutely necessary, as constituent parts, to the growth of many plants. The sulphate is essential to the growth of clover, and the phosphate to that of

wheat. Hence the efficacy of plaster of Paris and crushed bones as manures.

7. If lime or its sulphate be employed as the means of raising green crops, which have but small exhausting powers, the fertility of a soil may be maintained by ploughing them in, or increased by using them to feed cattle whose manure is applied to the ground.

ON THE RAIL ROADS OF NORTH CAROLINA, AND OF THE SOUTH GENERALLY.

Raleigh, May 25, 1836.

To the Editor of the Farmers' Register.

Your friend G. L. C. may be surprised to see me still alive. I attribute my miraculous escape to the fact that his first shaft has never reached me. He alludes to a "partial reply" which he had before made. This communication must have been sent to some other paper, or it must have been lost on its way to your's. I will hope the last, as I am not so magnanimous as to wish, with Dogberry, to see myself "writ down an ass;" and, perhaps, G. L. C. may spare me a repetition, when he sees how penitential I am under the castigation already received. If this reply has appeared in the columns of some other paper, I must apologize for not having seen it, by mentioning that the nature of my occupation prevents me from reading newspapers with any regularity.*

It is evident that G. L. C. has misconceived me entirely. I attempted to offer him some friendly advice, and he meets me with the front of Mars. I wished to admonish him of some of his foibles, and to persuade him to examine a little more closely into the subjects upon which he writes. I hinted, as gently as possible, that he gave his thoughts too wide a range, and thus subjected himself to the imputation of being desultory. I looked, Mr. Editor, to receive some thanks for my good advice, and to witness signs of improvement. Imagine my disappointment, then, when I found my advice construed into an attack; and I saw your correspondent unchanged in his dictatorial manner of settling questions, and holding fast to his old habit of touching upon every thing at the same time.

Mark the forcible style of reasoning. To prove that he was right in the plans which he advocates, he says, "It is now fully seventeen years since I imbibed the idea of the possibility of making the Chesapeake the great mart of American commerce, and Norfolk, the great gate through which it must pass." * * * * * G. L. C. imbibed an idea, seventeen years ago—and, therefore, he must be excused for considering it perfectly orthodox, and for looking upon every thing which opposes it as founded in "local interests, local prejudices, and local partialities."

> "O wad some pow'r, the giftie gie us,
> To see oursels as ithers see us."

We shall see, presently, whether G. L. C. has any of these local interests, prejudices, and partialities. I will not dwell on his fear of the "Empire State," nor on his idea of bringing the whole American commerce through Chesapeake Bay, for the good and valid reason that he thought of it seventeen years ago. I will take, for my purpose, an opinion clearly expressed in the former communication to the Farmer's Register, and which I understand G. L. C. as alluding to in the "trust" appended to his congratulations on the success of the subscription to the Raleigh and Gaston road. I mean the notion of Weldon being the only place on the Roanoke where a road from Raleigh should terminate. Can any one show me a more rank local prejudice? I can give reason upon reason, to prove that this is a prejudice, founded in no just reasoning. But permit me to return to the text. G. L. C. laughs at my speaking of "those who have long and zealously labored to promote a favorite scheme," (speaking of the Raleigh and Gaston Rail road;) and he taunts me with the silence of the Raleigh papers in time past. Now, your correspondent has yet to learn that there is a zeal which does not display itself in newspaper essays, and county meetings. I ask no stronger proof of the previous existence of such a zeal, than the success of the project when it was brought before the public.

But G. L. C. must not suppose that my ideas are confined between the Roanoke and Raleigh. When I speak of a favorite scheme, I regard the Raleigh and Gaston road as a very small link in a vast chain of public works, extending from the northern to the southern extremity of our Union—a chain of communication passing through the interior of the country, and connecting all the most important cities and towns of our land. When I speak of those who have long and zealously labored to promote this scheme, I speak of all the distinguished men, as well as the *humble unknown*, throughout our country, who have, at any time, contributed to this noble and gigantic scheme. I would ask G. L. C. if even *his* pen can stop the march of this work. Already has this line been completed, (with the exception of a few short gaps, which will soon be filled up,) from the city of Boston to Gaston, on the Roanoke. And two years will scarcely elapse before this line is extended to Raleigh. Nor do we propose to stop here, nor even at the Pee Dee, which our friend "trusts" we will reach. No one, who has watched the course of events, can doubt, for a moment, that the scheme will reach its original destination. If there has been a scarcity of newspaper flourishes, about this scheme, it can scarcely be said there has been "apathy" in prosecuting the work. Will G. L. C. take his map, and stretch a silk thread from Boston to Washington City, from Washington City to Petersburg, from Petersburg to Raleigh, and from Raleigh, through Columbia, southwards? I may safely leave him to follow out the thoughts which will be suggested by this experiment. I will aid him with one remark. Does Gaston appear to be too high up the Roanoke for a rail road between Petersburg and Raleigh to cross that river at? Or, does Weldon seem to be nearer the proper point?

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* It is proper to state, in explanation to both our correspondents, that no previous reply of G. L. C. was received; and that we had supposed, from the manner in which it was referred to by him, that some such previous piece had been inserted in some other publication. Ed.

Let him examine his map, and answer this question.

G. L. C. complains of my want of confidence in the stock of the Wilmington and Halifax road. He suggests that a line from Darlington and Harleesville, S. C. to Fayetteville, to Halifax, via Waynesborough and Tarborough, &c. &c., would make travellers forget that Raleigh was in existence. I will readily grant that this line would not secure the travel, if it were not extended south from Raleigh; and if, at the same time, the line he suggests were completed. But suppose the Raleigh route extended south—suppose both the conjectural lines finished, which, by the bye, is an exceedingly liberal supposition. I will again ask G. L. C. to apply the thread to the map which is lying at his elbow—for, without a map always at hand, no human memory could retain the names of all the towns, villages, rivers, &c. which are mentioned in his essay. I ask him to view the two routes, and weigh their merits strictly, but candidly.

Consider the superiority in direction of the route via Raleigh. The advantage of passing through so many towns: (three cities which this line passes through, and which are missed by the other, are the capitals of North Carolina, Virginia, and the United States.) Take into account, also, the healthy country through which this line passes; and then let him recollect the voyage across the bay—which, though often pleasant, is frequently disagreeable, and sometimes dangerous. I hope that he will, then, give up his local prejudices, and cease to oppose such a liberal and extended plan. Indeed, Mr. Editor, I cannot persuade myself that any rational man can examine the map, aud not see the striking advantages of the Raleigh route, unless he should be blinded by those sectional prejudices which G. L. C. so much abhors.

Your correspondent prides himself on Col. Long's having recognized the route he prefers. What mark of recognition Col. Long bestowed on this route, I do not now remember, not having the report by me. I apprehend, however, that, since the funds have been provided for making a rail road from Raleigh, to meet a road from Petersburg, at the Roanoke, the opinion of Col. Long would be materially affected by the change of circumstances.

The last notice taken of P. Q., in this miscellany, is a reference to a certain project which he mentioned in his former communication. Now, it was particularly cruel in G. L. C., under existing circumstances, to pretend to understand me as seriously proposing to confer the powers described in the paragraph alluded to, on any body of men. I thonght I had sufficiently guarded myself against such a construction. I said that there were certain objects to attain; that I saw no feasible plan for attaining them: but that I would endeavor to describe what end I thought desirable—leaving to himself among others to suggest some plan to secure the good, and shun the attendant evil. In short, I pretended not to give a practicable scheme at all, but merely to throw out hints to set more competent minds to thinking. The whole of the paragraph which follows the one just referred to, commenting on what G. L. C. calls my heterodox notions, is a tissue of false reasoning, supported by an example of the merits of which I cannot judge, for want of information on the subject.

How are rail roads to be made, if individuals are to realize no profits from them? Must government make them? I believe that it is a well established fact, that works made by government are far more expensive than those made by individual enterprise. It follows that a government ought to endeavor to stimulate private enterprise, rather than to embark its own funds. If G. L. C's ideas have been running on these subjects, seventeen years, he ought to have found out that there is no disposition among men to incur expense, for the mere pleasure of "indirectly adding infinitely to the wealth of the community." If he feels any ambition to act in such a disinterested manner, he is in a fair way of having abundant opportunities, in some of his own pet schemes.

I am sorry to see a man of such extended views, echoing the demagogue's cry of "odious monopoly." I grant that no greater monopoly should be allowed than would be sufficient to draw out the capitalists, and induce them to invest their money. But, without a reasonable degree of protection, it would be in vain for a state to hope that her own citizens, or others, will invest money within her limits.

You will perceive, Mr. Editor, that I have not followed your correspondent through all his ramblings, but have only endeavored to reply to the few casual notices with which he has honored me. I confess, however, that it was sometimes difficult to tell what was intended for me, what for Mr. Editor, and what for Congress, and the various lelatures. I regret that the piece was not divided into chapters, and each of our shares put under separate heads.

P. Q.

SKETCH OF THE AGRICULTURAL AND ECONOMICAL LABORS OF SIR JOHN SINCLAIR.

[It is from a biographical memoir of this distinguished man, of considerable length, and which is not yet concluded, that we extract this sketch of his labors as an improver of the soil and the wealth of his country—labors, which though highly advantageous in their results to his own private interests, were immeasurably more beneficial to Great Britain and to mankind. His biographer says that "from the days of Cato the Censor, down to those of Curwen of Workington Hall, there is no greater name in the annals of Agriculture, than that of Sir John Sinclair." This may, or may not, be exaggerated praise; but it is certain that no agriculturist has ever been directed by motives more purely public spirited and philanthropic, and none has met with more distinguished success, or gained so much celebrity.

In making these extracts, we have passed by all of Sinclair's public life that was not connected with agricultural and economical improvement. But there remains another portion, to which the memoir has not yet reached, which, if well treated, will deserve a place in this journal. This is the founding of the British Board of Agriculture, and the commencement and progress of the county surveys and reports, and other important measures instituted and effected by the Board—the whole of which produced as much benefit to the agricultural interests of Britain, as the plan, and its execution, reflected honor on the distinguished founder.]

Extract from the Quarterly Journal of Agriculture.

On his return to his native country in 1787, Sir John commenced those improvements on his own estates, which have tended in a great measure to give a new physiognomy to the shire of Caithness. In a paper, drawn up by himself at a subsequent period, he well remarks, "That it is a peculiar disadvantage attending the cultivation and improvement of a remote and neglected district of a country, that every thing is to be done, and that a great variety of new and important objects must be attended to at one and the same time. Those who live in a part of the island, that has already made considerable progress, can hardly form an idea of the difficulties which must be surmounted, when towns and villages must be erected, as centres of communication and business; when roads and harbors must be made, for the sake of domestic and of foreign intercourse; when manufactures must be established, to provide employment for the surplus population, which an improved system of agriculture, and the enlargement of farms, necessarily occasion; and when new breeds of animals, new instruments of husbandry, and persons skilled in new modes of cultivation, must be introduced from distant parts of the kingdom. If it is possible, however, by the application of a great capital, and of great attention, successfully to carry on these objects together, the one has a tendency to promote and to encourage the other; the spirit that is excited for the improvement of one article, rouses a similar spirit of energy in regard to another; and a new race of people is in a manner formed, who, from a state of torpor, ignorance, idleness, and its concomitant poverty, are animated to inquiry, roused to exertion, and impelled to obtain by their industry the acquisition of wealth."*

Nothing can be conceived more unpropitious, in an improveable light, than the estate, as it originally passed into the hands of Sir John Sinclair. It was situated in five parishes, Thurso, Halkirk, Reay, Wick, and Latheron; comprehended 100,000 acres, or more than a quarter of the whole surface of the county of Caithness; and was estimated at nearly a fourth of the whole rental. Excepting a few large farms, or what are called *Mains*, it was at that time occupied by a number of small farmers, to the number of eight or nine hundred, holding their possessions in what are called *rig and rennel*, or intermixed with each other; and, beyond the outer fence of this motley farm, were nothing but wide unenclosed commons, free to all the neighboring proprietors. A moiety of rent was paid in money; but by far the larger portion of it in grain, lamb, poultry, and other articles of produce.

Sir John found it, in the first place, necessary to establish some large farms, with a view of inducing persons of a competent property, to direct their attention to agricultural pursuits, as a suitable means of employing capital. As an incentive to others, he took into his own hands the farm of Stonefield, originally possessed by eight of the small tenantry; yet, deeming that a mixture of small farms is advantageous in a thinly peopled country, he encouraged them to settle in towns or villages, or in what have been since termed cottage farms. Having brought it into a proper state of cultivation, he let it at a very moderate rent, so as to induce the tenant to build a suitable house, and complete the improvements which had been commenced. To insure this, certain stipulations were entered into, by which the tenant was obliged to go on liming and marling to a certain extent every season; as, without this agreement, it was quite evident that the improvements would neither have gone on in the same degree, nor with the same rapidity.

To give the new system a fair trial, regular plans were drawn up of the different farms, by which it was ascertained how they could best be distinctly divided, and in what situations the houses and offices should be built. Services of every kind were abolished, as also *thirlage*, or restriction to particular mills. The miller was made a separate profession, whose care it was to bring the corn to the mill, and to carry it to market. The tenants were tied down to a regular rotation of crops, until the advantages of an improved system of husbandry should be made apparent to them; and every assistance was given them in procuring proper seeds, especially clover, rye-grass, and turnip. The selling of peat was prohibited, as an obstacle in the way of the tenants for collecting manure for their farms; and the burning of coals for fuel was recommended, principally with the view of keeping their whole attention directed to their farm management. Every facility was at the same time given them of purchasing marl; and lime was delivered to them at Thurso, at the lowest price at which it could be imported. Small premiums were also distributed, as an encouragement to industry. Many judicious hints were also at the same time distributed among the farmers. They were recommended in the taking of land to have sufficient capital at starting, and never to depend on credit; to study their profession carefully before commencing it on their own account, and rather to cultivate fifty acres well, than a hundred in a slovenly manner; to endeavour to raise the best grain, to keep the best stock, and to cultivate the ground at the least possible expense.*"

By following out this system of improvement, in a short time 2181 Scotch, or 2617 English acres, were brought under its operation—1046 as pasture, and 1135 as arable land; the farmers themselves confessing, that they had themselves been amply remunerated, wherever they had rigorously followed out the chart prescribed for them.

A plan was also laid down for letting the hill farms on Skinnet and Leurary. It was suggested that they should consist, as nearly as possible, of twenty-five acres each, with an acre for house, garden, and offices, while the remaining twenty-four should be subdivided into fields, each of four acres, calculated for a rotation of six years. The leases were to be for twenty-one years, and from one to five shillings an acre as rent for the first seven years, with a gradual increase during the remainder of the lease. On entering upon his lease, each tenant, on finding security for his laying out the same properly, was to get a sum of money to assist in building operations, and, at its expiry, a certain additional sum was to be allowed him, according to the value of the premises erected. The position of the house and garden was to be under the direction of the proprietor.

*See Sketch of the Improvements carrying on by Sir John Sinclair, Bart. printed anno 1803.

* Vide Appendix to Henderson's General View of the County of Caithness, p. 42–46.

It was stipulated that twelve acres should be put into a state of cultivation within the three first years, and four acres every year after, until the whole were brought under the plough. The subdivision of this part of the arrangement was, that, after the first seven years, the tenant should have eight acres in corn, eight in pasture, four in green crops, and four in sown grass, either cut green, or made into hay, and the rotation was to be thus—1. fallow, or green crops; 2. grain, with grass seeds; 3. grass, either made into hay or cut green; 4. pasture; 5. ditto; and, 6. oats; and so on till the expiry of the lease. The tenants were also to be allowed at entry a sum of money for enclosing, on finding security for executing the same, according to a plan laid down; and sheep, being so destructive to hedging, planting, and similar improvements, it was stipulated, that none should be kept without the express leave of the proprietor.

In a short time no less than fifty farms on this plan were laid down, in addition to the tract bordering on the old arable fields. Great exertions were made to bring this extensive tract into cultivation, and, even within the first year, considerable progress was made. The greatest difficulty the settlers experienced, consisted in the provision of hay and straw for their cattle and horses, until they could raise those necessaries themselves. In cultivating extensive wastes, it is for this reason necessary that there should be some arable land in the vicinity; and, from this circumstnnce not being sufficiently attended to, many attempts at improvement have been entirely frustrated, which might otherwise have proved successful.

The improvements in the parish of Wick and the lower part of the parish of Latheron were, at the same time, carried on with great energy and success by Captain Brodie of Hopeville. Houses were built, mosses drained, villages planned, wastes inclosed, harbors cleared, and roads made. On the grounds of Wester Clyth and Roster, great attention was also paid to the fisheries by Dr. Henderson. Where only one boat had been employed in the herring-fishery, he, in a short time, increased the number to thirty, exclusive of a number of small ones; and the produce of one year was three thousand barrels of herrings.

The improvements on the estate of Langwell were on a still more extensive plan, and were carried into effect with even still greater success. Besides theenclosure of arable, and the improvement of waste lands, it was resolved to raise the value of that extensive property principally by converting it from cattle into sheep farms. The great difficulty at the outset arose from the estate being occupied by not less than eighty small tenants, whose united rental did not exceed two hundred and fifty pounds per annum. Nothing was bred but a few cattle, and nothing fed but some wandering red deer, on the upper part of the property. Humanity, however, required that five hundred offenceless individuals should be provided for; and this was done by adopting the plan of cottage farms, each consisting of two acres of arable land. In reference to this property, Sir John Sinclair has well remarked, that "of all the means of bringing a mountainous district to a profitable state, none is so peculiarly well calculated for that purpose as the rearing of a valuable breed of sheep. A small proportion alone of such a description of country can be fit for grain; and, in regard to cattle, for every pound of beef that can be produced in a hilly district, three pounds of mutton can be obtained, and there is the wool into the bargain. Besides, wool is an article easily transported, of essential use, for which there is in general a regular demand, and which is capable of great improvement. Sheep, also, generally sell with less variation of price than cattle, and are easily driven to market.*"

In a pecuniary point of view, the advantages which resulted from these improvements on the estate of Langwell were very great, and within a few years raised the rental from under three hundred to above sixteen hundred pounds per annum; and, in a moral point of view, were of incalculable benefit to the natives of the district. A spirit of industry and emulation was introduced, and the women had spinning-wheels distributed among them by wheel-wrights, who were set up there for that purpose. Nothing, at first sight, could be more forbidding, more complicated, and operose, than this system; and yet, by perseverance, it was made to answer beyond the most sanguine expectations. A rude, was converted into a civilized district, and the country was improved, without being depopulated.

In connection with the estate of Langwell, it should be mentioned, that at the time when Sir John purchased it, he had commenced his plans for the improvement of British wool; and it occurred to him as a most proper place, to ascertain whether a certain breed of mountain sheep, to which had been given the name of *Cheviot*, would thrive in those more northern districts. Alike in Northumberland and in Caithness, the idea was scouted as visionary. Among the northern mountains, sheep had never been kept during winter, except in houses; and it was thought impossible to make them brave the boreal storms. Sir John, however, was determined not to abandon the attempt without trial; and knowing that, if he made it on a small scale, and trusted the sheep to the care of native shepherds, they would be allowed to perish, he sent north a flock of five hundred at once, accompanied by the most experienced shepherds. The succeeding winter happened to be a stormy one, with great falls of snow; yet the flocks prospered, and few suffered either from disease or want. The principal loss arose from the attacks of foxes in spring on the young lambs; and it required great vigilance to keep that nuisance under. In a short time it was found, that instead of perishing, the Cheviot sheep throve fully better in Caithness than even on their native hills, and their numbers had increased to six thousand.

When Sir John purchased the estate of Langwell, the rental was only £282, and he bought it for £8000; but so much had he increased its value by improvements of every kind, that when he was subsequently induced to sell it, it brought him the sum of £40,000—an increase quite unprecedented in the annals of buying and selling.

Having thus described, in a general way, the plan of agricultural improvement introduced by Sir John Sinclair into Caithness, both as adapted to the valley and mountain districts, we cannot do more than merely allude to the concomitant improvements accomplished, in the way of forming

* Vide Appendix to Henderson's General View of the Agriculture of Caithness, p. 58.

roads, raising plantations, working mines, establishing inns for the accommodation of travellers, constructing harbors, and opening up new channels for the extension of commerce and manufactures.

Great difficulties were at first experienced in improving the roads in the county of Caithness, the soil being either of clay or peat, and the materials for making or mending them of a softish quality. Sir John, however, got Government interested in the undertaking; and perhaps the greatest exertion ever made in road-making in Scotland was when he had 1270 men employed at one time, along the side of the hill of Bennichiel, and laid down six miles in one day. Nor was the situation of Caithness more favourably adapted for the growth of plantations, being a promontory, two-thirds of which are surrounded by the sea, whose spray is so injurious to the growth of trees. Add to this, that the soil of a great part of it lies on a flat rock, preventing the roots from penetrating to a proper depth. Attempts were however made, with considerable success in many places that seemed of little promise; and, in the parts adjoining Sutherland, on the eastern coast, not less than 320,000 Scotch firs, besides 22,000 larches, ashs, mountain ashs, elms, and sycamores, were thriving in situations which at one time appeared destined to perpetual sterility and bleakness.

In the fisheries, a new source of wealth and industry was opened up to the inhabitants; and they, to this moment, continue, as all know, in a most thriving state. Indeed, no district in the British dominions is better calculated for that branch of commerce, there being above forty different varieties of fish, either in the fresh waters of the county or in the adjacent seas. The greater part of the cod with which the London market is supplied, is taken almost within sight of the town of Thurso, and the fishing-smacks employed for the purpose rendezvous at Scrabster Road, in its immediate neighborhood. The most important branch of the fishery, however, is that of herrings, which are cured for home or foreign consumption. Sir John Sinclair early foresaw the extent to which these fisheries might and would be carried; as also their vital importance to the prosperity of Caithness. So early as 1787, he induced the Messrs. Fall of Dunbar to re-establish the cod-fishery, which had been nearly abandoned for many years; and he furnished capital to John Sutherland of Wester, and to John Anderson of Wick, to enable them to commence a herring-fishery on the east coast, which ultimately proved so successful as to have yielded, in one year, above 200,000 barrels.

Sir John also procured public aid for increasing harbor accommodation; and, at the expense of £12,000, that of Wick was completed. An act was also obtained for constructing the harbor of Thurso, which if completed would prove so beneficial to the neighborhood. From the sale of the surplus produce of the farmer, an incitement was given to commerce; and while he was accumulating capital wherewith to improve his stock, the quality of his grain, and his implements of husbandry, as well as increase his domestic comforts, his intercourse with the trader tended to mutual prosperity and enlightenment. The commerce, which had hitherto been insignificant, and consisted chiefly of grain, cattle, and fish, rapidly increased; and a trade has been opened up, not only with the Baltic, but with the West India Islands. Tanneries have been erected, bleachfields laid down, and woollen manufactories established.

Impressed with the idea, that wherever a number of inhabitants are collected together, they furnish a market for agricultural produce, which of course increases with the demand, Sir John used every exertion to enlarge the town of Thurso, at that time containing sixteen hundred inhabitants. It was, however, very irregularly built, and in some parts so crowded as to be prejudicial to the health of the people. He therefore resolved on laying down the plan of a New Town, to be built regularly, and in which he consulted both beauty and convenience. How well this has succeeded the reader need scarcely be reminded. Its situation for commerce is admirable, being within a few hours sail of the German and Atlantic Oceans; and nothing can surpass its convenience for fisheries, that great source of northern wealth. It is pleasing to think, that almost by the unaided enterprise of one mind, what was in the memory of man the bare bank of a Highland river, is now a flourishing town, with its churches and market-places, its boarding-schools and academies, its shops and warehouses; that the silence and the solitude is now filled with the hum of human life, and that elegance and comfort have taken the place of those necessities, which chained down man to an estate so much beneath his physical capabilities, as well as his immortal destiny.

Such is a meager and general outline of the improvements which Sir John Sinclair planned, attempted, and successfully carried into execution, in the shire of Caithness. Let it be remembered, that when he succeeded to his estate, the whole county might be said to be in a state of nature. The tenantry had not a single cart in their possession; and, even if they had, there was not a single road anywhere. Every article, not excepting manure, was carried on horseback, and the ground was almost everywhere cultivated on the common field, or alternate ridge system. So numerous were the disadvantages under which his improvements—by many they were considered mere innovations—were commenced, that they would have daunted and cooled a spirit of ordinary energy and enterprise. He had not only to arrange plans, but he had to provide the adequate capital for carrying these into execution. He had not only to procure from other districts the hands requisite for various branches of the intended system of improvement, but he had to overcome the prejudices, many and deep-rooted, of the natives themselves, and stimulate them to worthy exertion. All this was carried on in the midst of a foreign war, which diminished the number of laborers, checked circulation in the remote provinces, and augmented public burdens, already but too severely felt. How successfully, however, may be attested by comparing the population census of the kingdom in 1810 with that of 1820. It will there be seen, that the proportionate increase is greater in Caithness than in any county in the British empire; and not only was the population numerically greater, but one of a very different kind, from what had inhabited these shores in previous generations. Enterprise, industry, morality, and religion, went hand in hand together. The coasts were occupied by extensive fisheries; and the soil, allowing for difference of climate, exhibited as excellent, and as skilful management, as the most celebrated districts of the Lothians.

Pope, however, has well remarked, that "envy will follow merit like its shade." Many minds were incapable of taking in the extent of operations, which to their feeble comprehensions seemed theoretic and Utopian. There was too much uprooting of old prejudices not to excite detraction and invidious surmises; and these feelings were necessarily aggravated by the circumstance of its being requisite to remove many from their humble and rude, and unambitious, yet ancestral dwellings, to give scope for what sceptics set down as mere experimental speculations. Attacks, on this score were made upon Sir John, even in some of the English newspapers. But to more than counterbalance the ignorance and ingratitude regarding the character of a great man, which these manifested, he was presented in 1811 (when his plans had received "ample room and verge enough" for practical application,) with an address from the magistrates of Thurso, "acknowledging with gratitude, that, amidst other pursuits of a more extensive tendency, the improvement of his native county had been the peculiar object of his care and attention." Previous to this, the Lord Lieutenant and Freeholders of Caithness had tendered him a vote of thanks for having carried through so many measures, which had proved "a solid foundation for the future prosperity of the county." Before leaving this part of our subject, it is pleasing to add the testimony of one of the great living ornaments of the Scottish bar, to the merits of the subject of this biography. Mr. Forsyth, in his dedication to Sir John Sinclair of the fifth volume of the Beauties of Scotland—that containing the Account of Caithness—eulogises him in the following terms:—"Sir, this volume is respectfully addressed to the distinguished promoter and patron of the important art to which nations owe their subsistence; of whom, in future times, it will be said, that he found means to diffuse among mankind a larger portion of useful knowledge than had been accomplished by any individual of his own, or of any former age." We make no commentary on these sentiments, so true in themselves, and so simply, yet beautifully, expressed. On the one hand, it must have been delightful to know, that the merited subject of such a panegyric was of his own nation and generation; and, on the other, it must have been no small gratification to be thus made aware, that the philanthropic labors, intended for the good of all mankind, were at least appreciated by the wise and good among them.

From the Arcana of Science, for 1836.

CHEMICAL COMPOSITION OF BROTHS.

The erroneous notions entertained by many respecting the administration of soups and broths, as articles of nourishment to invalids, may derive some correction from such investigations as the following:—Five hundred grains of meat, deprived of bone, fat, and tendon, were put into a litre and half of distilled water, and gradually brought to the boiling point, and continued so for five hours, renewing the water as it evaporated. The decoction had the odor of soup, an agreeable taste, and yellowish color, contained 12 parts in 1,000 of animal matters, and 3 parts in 1,000 of inorganic: spring water, containing sulphate and carbonate of lime, afforded a broth of less odor, and inferior taste. When the meat was put into boiling water at once, the proportion of animal matter in solution was less, and the broth inferior to that obtained by heating gradually. The difference in flavor of broths appears to depend more upon the nature and proportions of the saline than the animal ingredients. In boiling meat in the usual manner, the albumen is partly dissolved before the temperature is raised to the degree at which it coagulates, when the remaining portion is partly coagulated, rises in scum, and partly dissolved in the water; the cellular membrane is partly dissolved, but some of it remains in a more or less indurated condition. The fibrine of the muscle is hardened, but none of it is dissolved, and if it was not for the cellular membrane, albumen, and oil between the fibres, would prove a refractory article of diet. The fat remains partly entangled in the meat, and partly floats at top; the flavor of broths arises from it in a considerable degree: much change is effected by evaporation, decomposition, and new combinations, during protracted boiling, and volatile parts upon which the flavor principally depends being dissipated. These experiments were instituted to determine the nature of the peculiarities of broths obtained from the dried extracts of meat, called portable soups; and from the results, as well as from common experience, it may be inferred, that the most palatable and suitable broths or soups for convalescents, requiring great care as to delicacy of diet, may be obtained by soaking the meat for some time, at a low temperature, and setting aside the solution, to which should subsequently be added the stronger broth obtained by adding fresh water to the meat, and continuing the boiling; or palatable broths may be made with little delay by macerating the meat for a short time, in warm water, and adding jelly, previously prepared, in such quantity as may be advisable.*

From the Arcana of Science.

METHOD OF DESTROYING MICE, &c., IN THEIR LURKING PLACES.

M. Thenard, in 1832, submitted to the Academy of Sciences a plan for destroying noxious animals, when they have taken refuge in their hiding places. The instrument of destruction is sulphuretted hydrogen, which he had remarked to be peculiarly deleterious to animal life. Animals, when allowed to breathe the pure gas, fall down as if struck with a bullet. Even when considerably diluted with atmospheric air, the effects are deadly. A horse dies in less than a minute, in air containing $\frac{1}{250}$ of this gas. A dog of moderate size is speedily killed in air containing $\frac{1}{1000}$, while a greenfinch expires in a few seconds, in air possessing $\frac{1}{1300}$ of sulphuretted hydrogen. Influenced by these facts, the French chemist proposed the employment of this gas to several individuals for the purpose of extirpating noxious vermin, but his suggestions being treated with indifference, he determined to put the method in practice by his own experiments.

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* From a report of M. Chevreul to the Royal Academy of Sciences, noticed in the Journal de Pharmacie; and translated in the Dublin Journal, No. 23.

His first trial was in an apartment infested by rats, which showed themselves occasionally during the day, and at night were actively engaged in plundering a chest of oats, to which they had access through an aperture of their own formation. The holes by which they retreated amounting to 18 in number, Thenard adapted to each of them in succession retorts capable of containing half a pint measure, by introducing the beak of the retort, and filling up the interval round its neck with plaster. Sulphuret of iron was deposited in the retort, formed from a mixture of iron filings, sulphur and water, and dilute sulphuric acid was introduced by means of a tube placed in the tubulure. The sulphuretted hydrogen was disengaged with great rapidity, and in a few minutes not a rat remained alive in the building. His next experiment was in an old abbey, where he was equally successful, and having opened up part of the wall he found many dead rats. He recommends the application of this method to the destruction of moles, foxes, and all animals which cannot be extirpated by the usual means. Thenard then gives popular directions for the formation of the materials required to produce the gas.

Mix 4 parts of iron filings, 3 parts flowers of sulphur in a mortar with a pestle. Place the mixture in a convenient vessel, and moisten it with 4 parts of boiling water, stirring it with a piece of wood or glass. Add gradually, afterwards, 4 parts more of water, and introduce it into the retort. Pour upon the mixture common oil of vitriol, diluted with five times its volume of water, and continue to add it gradually till the effervescence ceases. Should any of the gas escape into the apartment, and occasion inconvenience, it may be removed by dropping a little sulphuric acid upon bleaching powder. The holes should be closed immediately, to prevent the disagreeable effects of the putrefaction of the carcasses of the animals which have thus been destroyed.*

EFFECTS OF GYPSUM AS MANURE NOT LESSENED BY ITS EXPOSURE TO THE WEATHER.

To the Editor of the Farmers' Register.

Albemarle, May 26, 1826.

Volume 2, No. 10 of the Farmers' Register, contains some "inquiries and remarks on the effect of exposing gypsum to the weather," with your reply thereto. Having made the inquiries, I feel it my duty to report the result of my experiments, with the gypsum which was the subject of them—and have the pleasure to inform you that it is entirely satisfactory, and corroborates your own views in relation to the gypsum, to wit: "that it was not altered in its chemical character, nor materially injured," by the causes mentioned. It had sustained a tour of the seasons—had been under water several times, in a partially pulverized state, on the margin of James River, and when I moved it from thence, was hard frozen in the hogsheads. The lumpy parts were easily reduced to powder, by beating in a trough, with wooden pestles, rendered the more so, no doubt, by the transitions of weather, through which it had passed. The ensuing spring, it was applied to wheat and clover, in the usual manner, and upon corn, after it came up. In the latter case, the effect was very distinct at the distance of 300 yards, on the 4th of July, and the rows counted, (*after dinner too*,) by gentlemen who were not informed in what part of the field to look for them.

The effect on clover is equally apparent at this time, and is proven by beds left unplastered through the field in different parts. On these, the clover is thin, and of a pale, sickly hue, whilst on either side, it is a luxuriant mowing crop. One experiment was made, with a mixture of ashes, in the proportion of one half; here the deficiency of plaster is visible. But the most striking and valuable part of these experiments, is the effect of plaster on top-dressing. Several adjacent beds were top-dressed, with half-rotted stable manure, and one of them unplastered; this exhibits but little improvement—its neighbors showing a very high degree of it. This, I know, is nothing new; still, I believe there are many farmers so extravagant as to practice top-dressing without plaster. All these experiments establish the stimulating property of gypsum, which, by a mysterious action upon the organs of the plant, imparts vigor to its growth. Here, I take it, some inherent quality of soil is a necessary principle. The last decides its quality as a septic, and it is in this mode of its action, I presume, that its absorbent power is useful. This power would be of but little value, I imagine, without the subject for it to exert itself upon, no more than the evening dews.

To the young experimentalist, it is extremely discouraging to be told that there are certain soils to which the God of Nature has denied the aptitude for gypsum, that "sweet restorer:" but how ought his hopes to revive, to know that its action is alike upon leaves, straw, stalks, and all putrescent substances; which at last are the *media* of all permanent improvement. So far, all may have its beneficial effects; and, so far, I feel authorized to add my testimony to the present mass, that the cost will be repaid, with handsome profit, upon any land.

C. H. H.

From the Horticultural Register.

REPORT MADE TO THE SOCIETY FOR THE ENCOURAGEMENT OF NATIONAL INDUSTRY.

By Mr. Soulange Bodin,

In the name of the Committee of Agriculture.

On an experiment in breeding silk-worms, made, in 1835, *by Mr. Camille Beauvais, on his estate of Bergeries de Senart, near Montgeron, in the department of the Seine-et-Marne.*

GENTLEMEN: You have referred to your committee of agriculture, the examination of a letter, which was addressed to you, on the 20th of June last, by Mr. Camille Beauvais. It calls your attention to one of the most important subjects of agricultural and industrious economy which interests the age in which we live.

Indeed, gentlemen, among the thousand various branches of industry, encouraged and rendered fruitful by your institution, a certain number of

* Annales de Chimie, translated in Thomson's Records, No. 1.

which gradually attain perfection in each year, and which you are anxious to verify, reward and render profitable to all, there cannot but be perceived the favorable indications and anticipated results of that great phenomenon, which characterizes modern society,—*Progression*. Every thing advances and is elevated, under the same secret impulse—individual benefit, towards the same apparent end—the public good; and in this universal movement, which is governed by an exalted philanthropy, each receives quietly, in his turn, the reward of his efforts, under the common banner of circumspect emulation, which neither contains, or occasions the least germ of dissension, or active opposition.

But it is different, when one of those bold, exclusive, and innovating ideas, which are occasionally advanced, by ardent minds, and whose natural enthusiasm is sustained by profound conviction, which astonishes the multitude, and tends to displace some ancient order of things. These commanding ideas, necessarily, disconcert inveterate habits, as to the correctness of old opinions, and excite against them precedents, which are enveloped in the legitimacy of time. A conflict of opinions is then produced, during which the human judgment long combats natural facts, and truth, on whichsoever side she may preponderate, will sometimes, be very dilatory in her triumphs.

It is, gentlemen, a spectacle of this kind which is now offered for your consideration, by an able agriculturist, who has established himself within a few years, near Paris, on an indifferent, refractory and arid soil. It has been said, that this man only wished to put his foot upon our land; that to advance, he calculated but little on the profits of the plough, and that he only sought a spot, where he could realize the treasure, which, as yet, existed but in his head.

This treasure, which Mr. Camille Beauvais now offers to your inspection, was not, in fact, gentlemen, but an abstraction, which he could thus have stated:

"To lay the foundation of his own fortune and increase that of the nation, by an improvement, which will certainly promote the cultivation of silk, in the centre and in the north of France."

After many experiments, he believes that he has, at last, caused a new fountain of private and public wealth to arise, out of his own arid land, and far from desiring to engross it, for his exclusive benefit, he invites us to draw from this fountain, which will be inexhaustible, if his zeal for the public good has not greatly deceived him.

Mr. Camille Beauvais belongs to the South: he had only to establish his magnanery* in the South, and to manage it, in conformity to the system with which he was already familiar; he knew the efforts which had been vainly attempted in preceding ages to breed silk worms in the North. Every thing attracted him on one side, while all was repulsive on the other; but he said to himself:

"Every branch of industry is advancing; why does that of silk always remain, very near what it was, when it passed from Italy into France? The sciences, as physics and chemistry—the recent discoveries in which have been so remarkable, and whose aid can be invoked, were then scarcely known to the husbandman; why then should this branch of industry remain irrevocably confined to its ancient cradle? Should the losses, which have sometimes been so discouraging, be attributed, rather to the constitution of the precious insect, by which this culture is maintained, than to the insalubrity of the situation, and the variations of the atmosphere, which have such a powerful influence upon a life, at the same so full and so brief? They cannot be imputed to the north, where the silk-worm is not now bred, when they so cruelly afflict the delightful climate of the south, which is reputed to be exclusively propitious to them.—Wherever the mulberry tree grows and prospers, the worm which feeds upon its leaf, ought to be able also to grow and prosper. Do not perpetually neglect the accidental conditions of beings! Why cannot I create, under the shelter, where this worm accomplishes its destiny, an isolated climate free from all local influence? I can, in fact, more easily protect them from the less sudden changes of the intemperate climate of the north, than they can be screened from the capricious temperature of the south. What do I say? There is no longer either north or south; for I perceive that it is possible to command and combine, in their confined asylum, fire and water—those two great promoters of all organizations, and to imitate for them those winds, which maintain without the salubrity of the air, and scatter to a distance deleterious effluvia."

I have put these words in the mouth of Mr. Camille Beauvais, gentlemen, not to extol or over estimate his theory, but because they express the bold and profound thoughts, which must have presided at his establishment, and contain the principles upon which all his labors were prosecuted. It was at his own expense, and his own risk, that, under the influence of his own convictions, he for seven years, put these principles in practice, with continually increasing results, without being discouraged by a few mistakes which he nobly confessed without being intimidated by the inquietude of his friends, or the doubts which he saw arise, like clouds, ready to obscure the brilliancy of his first successful experiment, and to blast, perhaps for ever, his fondest hopes.

It would be superfluous to enter, here, into the general details of cultivation, which every friend of agriculture is invited to examine, at the establishment of Bergeries. They have been described elsewhere; and that is not now the subject of inquiry; it is sufficient to say, that it is upon 67,000 mulberry trees, of the best species, and of the most luxuriant growth, among which are to be seen a great number of the morus multicaulis, that Mr. Camille Beauvais principally founds his hope, of a second annual brood of silk-worms which he proposes to undertake. These trees, including nurseries and established plantations, contain sixteen hectares and a half of land.

The establishment, in its present condition, is capable of rearing annually the number of silk-worms which are produced from one hundred and fifty ounces of eggs. During the five last years the mean product of an ounce of eggs in the establishments of the south, has not exceeded from fifty to fifty-five pounds of cocoons, that is to say, only about 10,000 silk worms out of the 42,000 eggs, which an ounce contains, reached that last period, which unites a simple worm to the enjoy-

* The name given to the apartment in which silk-worms are bred.

ments of a refined civilization. On the contrary, Mr. Camille Beauvais' first brood, gave him sixty-seven pounds of cocoons, for each ounce of eggs. He has been constantly progressing. during the years 1830, 1831, 1832 and 1833; in 1834, he obtained 104 pounds of cocoons. All these facts are generally known. His last brood gave him 137 pounds; this brood was from eight ounces of eggs, and the worms were kept in a temperature equal to from 18 to 20 degrees of heat according to Reaumur's thermometer—[equal to 72 and 77 of Farenheit.] They continued their labors for thirty-seven days, and consumed 16,830 pounds of leaves, the product of trees, half of which were grafted, and the other half seedlings. They yielded 1,101 pounds of cocoons, of the most beautiful quality, large, firm, and of an admirable whiteness. It does not appear, that such a result has been obtained any where else, in any large establishment; nevertheless, Mr. Camille Beauvais, is the first to inform you, that one of his pupils, Mr. Henry Bourdon, who had recently left the Polytechnical School, and is a proprietor at Ris, terminated an experiment, in which the proportional product, amounted to one hundred and seventy pounds of cocoons, to an ounce of eggs.

We have seen that an ounce of eggs produces 42,000 worms; Mr. Camille Beauvais employed eight ounces of eggs; he should, therefore, have had 336,000 silk-worms. He actually realized 1,102 pounds of cocoons; it requires, at Bergeries, but 360 cocoons to make a pound; he has then obtained only about 286,520 silk-worms. He lost 4,000 when they began to rise, to form their cocoons, by the bad arrangement of the heaths, or twigs, and an imperfect ventilation. He has then lost in the first ages, including the eggs which did not hatch, 45,480.

It results from an analysis, which Mr. D'Arcet has been so kind as to communicate to me, that the air of the magnanery of Bergeries, during the fourth age was slightly alkaline. The water, which was there condensed, by means of a globe filled with ice, and which was found to be as limpid as distilled water, was slightly alkaline. The nitrate of silver did not form a precipitate at the moment of admixture, but it immediately afier assumed a faint brownish red color. At this period of the brood the ventilation was well regulated. The air was so little altered, that it was difficult to discover carbonic acid upon the tub of water, and ediometrical experiments made with this air, either by phosphorous or deutoxide of azote, indicated as much azote and oxygen as the atmosphere; it contained very feeble traces of ammonia, combined with carbonic acid.

At the period the worms begain to ascend, the ventilation, as has been stated, was interrupted and in part suppressed, by the heat; the air of the magnanery ceased to be pure. Mr. Henry Bourdon, who made the analysis of the air, found it to be composed of

Azote and carbonic acid	82,57 parts
Oxygen	17,43
	100,00

It is known that atmospheric air contains 79 parts of azote and 21 of oxygen. It is apparent, then, that the air had become very much vitiated. At this period the water in the magnanery, and which was condensed, by the means of ice, was limpid; it had neither color, nor savor, was alkaline, and not rendered turbid by the addition of nitrate of silver; but almost immediately assumed a faint brownish red color, and that there was suddenly formed, an abundant brownish red precipitate, which did not appear to have been perfectly defined.

An opinion can be formed of the effect produced on silk-worms, which are constantly confined in the magnanery, which is not properly ventilated, by the following experiment, which Mr. D'Arcet made upon some which were reaching their last state, and which were bred in a pure air; he confined twelve large silk-worms taken in their fourth state, in a quart bottle, in which had been placed some mulberry leaves; at the end of twenty-four hours, the air contained in the bottle had diminished in volume, was alkaline, and contained,

Azote	79,11 parts
Carbonic acid	17.50
Oxygen,	3,39
	100,00

The air, therefore, in the bottle, was almost completely vitiated, one of the worms was dead; the others were shortened and shriveled, and of a dirty greenish yellow color, and scarcely moved; three died soon after being placed on fresh leaves; the eight others ate but little, three only made a small quantity of silk before they died, two changed into the chrysalis state, without spinning, and three died without spinning or changing.

I have before stated, that Mr. Camille Beauvais should have had 336,000 silk-worms, from his eight ounces of eggs. He then realized from one hundred eggs only 85.27 cocoons, and lost 14,73 worms and eggs, which did not hatch. By adding to the 286,520 worms which spun, the 4000 which died, at the time of ascension, we have 290,520, which completed their growth. These worms consumed 16,830 pounds of leaves. Fresh leaves contain, of

Dried vegetable matter	32 parts
Water	68
	100

Each silk-worm then had eaten, in the whole course of its life, 29 grammes of fresh leaves, or 6,28, g. of dry vegetable matter*

I have, gentlemen, pronounced the word *Pupils*. Mr. Camille Beauvais defines himself to be a man of conviction and progression; but that conviction, that progression, and his ardent and disinterested zeal loyally seeks to establish an empire, an extension, in which their influences shall indefinitely increase. To attain that object, he has gratuitously opened a school of theory and practice, whither resort the young proprietors from all parts of France. This year they hurried—that is the word, to his establishment, to the number of fifteen. Among them are to be found, with Mr. Henry Bourdon, the pupils of Roville, the Marquis Amelot, a large proprietor in Gatinais, the son of Baron Mellet, who has an extensive sugar

* Mr. D'Arcet has ascertained, that there are 5,58 parts of azote in 100 parts of the dry vegetable matter of the leaves. A silk-worm, then, does not find in all the leaves it eats during its whole life but 0,518, g. of azote. Silk contains 11,33 parts of azote in 100.

refinery at Choisy-le-Roi, Mr. Bella, son of the director of the model farm of Grignon; Mr. Baynard, late prefect of the Haute-Alpes, and of Maine-et-Loire, who is now establishing mulberry plantations near to Bergeries. After having employed a part of their time in attending to the breeding of the silk-worms in all its minutest details, and assisting with their own hands in the cultivation and management of the mulberry tree, under the direction of a nurseryman of the south, who is attached to the establishment, their worthy master assembles them, for two hours in each day, for the purpose of instructive conversation, when they recapitulate, or compare all the observations of the day, or discuss all the advantages, which, from their elevated point of view and their social condition, they are enabled to perceive their country will derive, from the interesting subject of their studies and experiments. What truly logical ideas, what lights without shadows, what germs of amelioration, rendered fruitful by this powerful reconciliation of observations and facts, have already been produced by those young and studious citizens—the legitimate hope of agriculture and the state! To present to you, gentlemen, in a single word, their deep conviction of the advantages they have gained, from their connexion with Mr. Camille Beauvais, and the sentiments, which his generous attentions had excited in their hearts, I should inform you, that before their departure, they unanimously voted to present him a gold medal, as a brilliant testimony of gratitude, the most sensibly felt and the most worthily merited. This medal has been struck at Monnaie, but the resolution is yet unknown to Mr. Camille Beauvais. A great number of persons have already made application to him, to be received at his establishment the approaching season.

One of these pupils, Mr. Peycams, nephew of Mr. Caussade, Col. of Artillery and proprietor of an estate in Guadaloupe, has paid particular attention to the management of the *filature*. He is going to that island, at the request of the principal planters, to instruct the black females, in the reeling of silk, from the cocoons; for this purpose, he will take with him the complete apparatus for a *filature*. But Mr. Camille Beauvais acknowledges, and has published in terms which at the same time delineate his character, his gratitude and his love for truth, that for the pleasing results which he has obtained this year, and which were chiefly produced by his own intelligence, the lofty reach of his genius and his determined perseverance, he is incontestably indebted to the apparatus for ventilation, which Mr. D'Arcet has already made known to you, which was applied to Mr. Grimaudet's very complete magnanery, and the plan and description of which, the Society for the Encouragement of National Industry has published in its *Bulletin* under the name of *Salubrious Magnanery*, which Mr. D'Arcet had given to it. After various experiments, Mr. Camille Beauvais says, this simple and cheap apparatus has finally proved, what he had conceived might possibly be attained, and what he had for a long time sought; *an equal temperature and a pure air constantly renewed:* conditions, which joined to careful attention and cleanliness, approximate as nearly as possible, the artificial breeding of silk-worms, in those limited apartments, where it is necessary to confine them in Europe, to the most favorable condition in which they have been placed by nature.*

The first application of Mr. D'Arcet's system of ventilation, at the establishment of Bergeries, has, at once, imperfect as must yet be an operation, which, for want of time, could only be considered as an experiment, had a success, which cannot fail to interest every enlightened mind. God forbid, that what remains for me to say, should diminish the merit of the applicator, and his right to your respect! On the contrary, Mr. D'Arcet has himself declared that it was Mr. Camille Beauvais, who, communicating to him an opinion which that learned man had formed in travelling through the south of France, on the culture of silk-worms, and had requested him to consider the subject, and make a plan of a magnanery. French agriculture will please then, I hope, to unite in the same sentiment of esteem, the learned and the practical man. I say, French agriculture, for it should not be doubted, if the interesting experiment which has been submitted to your consideration, should have such an important influence on the production of silk in the central and northern parts of France, how much more efficacious still will it be in ameliorating the culture of the south! Will not the most cautious men—those ancient agriculturists, who have so great a right to intrench themselves behind that prudence which we respect in them, and which is the treasure of their life, wish at least, that such experiments be repeated and extended? But the subject is so important, and the inquiry so grave, that I request, gentlemen, your permission, to enter into some details, previous to presenting a short summary of the essential conditions, for the proper management of silk-worms, and the means which are now employed, to render the air of the magnanery salubrious.

If the organization of the silk-worm is carefully examined, and it is found that they respire only by their stigmata,† and if the gas they expire, especially during the period of their last change, is analyzed, no one can fail of being convinced of the importance of a gentle and continuous circulation of air, in an apartment where millions of these little insects are assembled and extended on frames which emit deleterious exhalations.

On attentively observing the continual exertions which are made by these small animals, both by dilation and contraction, and which are repeated without cessation, especially at the moment of moulting, it will be seen that all their functions are in operation with greater or less activity, according to the heat to which they are subjected, and it will be readily perceived to what danger they are exposed, from sudden changes of weather.

Great humidity in the magnanery is of itself fatal to silk-worms, while it produces a fermentation in the vegetable and other matter which collects on the frames where they are fed, and thus vitiates the air they breathe; therefore, cultivators

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* There is in China, a wild species, which feed in the open air on the mulberry trees of the country, and which have not yet been domesticated.

† The silk-worm, and the larvæ of other insects, instead of breathing through the mouth, like other animals, breathe through the spiracles or stigmata, which are holes in the rings on each side.

dread, especially in the fifth state, the cold and damp winds of the south. Besides the exterior humidity, a great quantity is developed in the magnanery, from the leaves and from the worms themselves.

The dryness of the air, besides being essentially injurious to silk-worms, as to all other animals, even when in the greatest possible purity, withers and crisps the leaves; and the worms, instinctly perceiving that they require a certain quantity of water in their food, reject the leaves as soon as they wither; there is consequently the suffering of the worms, as well as the loss of leaves.

All intelligent cultivators know, from their own experience, how important it is to fulfil all the conditions of a continual renewal of the air, a uniform temperature, and an invariable humidity; but from a want of the means for doing this properly, they are compelled to guard against the injuries which may arise as well as they can, and to this end, they are in the habit of burning in the apartment aromatic plants, boiling vinegar with cloves in it, sprinkling the worms with chloride of lime, &c. But the inefficiency and even danger of these expedients is readily perceived.

Dandolo, the distinguished cultivator of Piedmont, delayed not in ascertaining that these means were detrimental to the silk-worms, and immediately and completely reformed the art of managing his establishment. To purify a magnanery, he made holes in the floor, ceiling and lateral walls, for the admission of fresh air, and the escape of these fumigations, which he had ascertained were dangerous; and in the magnanery, constructed on his plan, and called *Dandoleries*, the proprietor obtained from 100 to 110 pounds* of cocoons, instead of from 50 to 60 for each ounce of eggs; but his imitators, unfortunately, are but few, in consequence of the want of encouragement in Piedmont. Here is the subject presented for consideration in France, where encouragements are not wanting.

Nevertheless, the system of Dandolo is yet defective; he established his fire-places or furnaces in the magnanery, and the immediate action of the heat which is developed, and the exhalations which arise from the combustibles, cannot but be injurious to the silk-worms. Besides, his means are often ineffectual, especially in lowery and stormy weather, when the air does not freely circulate, and when it is necessary to have recourse to fumigations of chloride of lime, the application of which it is far from being practicable at all times to make, with the desirable exactness.

It is necessary, then, to employ more powerful and infallible means, for illustrating the principles of sanitory purification developed by Dandolo: it is thus that science assumes its control over the subject, and completely annihilates the action of exterior influences, removes the source of heat beyond the magnanery, and is enabled to realize, simultaneously, the four conditions so essential to success in the management of silk-worms.

In the system of D'Arcet, the magnanery is in the second story, and the furnace or calorifery, is in a small apartment in the lower story, which is called the air-chamber. The air issues from this chamber into pipes, which extend the whole length of the floor of the magnanery, and from which it issues through circular holes of various sizes. In the ceiling, are made a number of conduits and openings, perfectly symmetrical with those below, and it is by these superior openings that the air escapes through a funnel into the chimney of the furnace, which receives the pipe of the calorifery, after having been introduced into the magnanery, by which a continual warmth is kept up.

It is only necessary, then, that a proper temperature and humidity should be maintained in the apartment; and this result is easily obtained, for, by the aid of a furnace, ice, moist cloths, and desiccating substances, there can be produced heat, cold, humidity and dryness.

In the month of April, 1833, Mr. D'Arcet sent to Mr. Camille Beauvais, his plans of "Salubrious Magnanery," and as the period of breeding the silk-worms was near, the application of the system and a knowledge of the result, would be postponed for a year if it was suffered to pass, Mr. Camille Beauvais was impatient to test this scientific theory by an experiment, the success of which was guarantied by his experience in the management of silk-worms. In a month he constructed a new magnanery, which was so judiciously arranged, as to insure to him all the advantages which could be derived from the proposed improvements. He corrected, as soon as possible, such imperfections as necessarily arose from the novelty of the system applied to the rearing of silk-worms, and the precipitate manner, in which the work was executed.

Mr. Camille Beauvais, immediately found in the interesting and successful result which he obtained, the prize of his assiduity and his devotion;* and has the gratification of having demonstrated more clearly than had before been done, that a new era may be commenced in the culture of silk—thanks to Mr. D'Arcet's system of salubrity, for the application of which, it only requires a careful and attentive workman to execute the instructions which he has given, in a perfect manner. (1)

Still, gentlemen, if the important fact which has been established near the capital of the empire, seems to countenance those bright hopes which numerous enlightened men have entertained, it is proper to declare—it is proper to repeat, in the sincerity of truth, which repulses all equivocal triumps, that whatever confidence this remarkable experiment merits, and has already obtained, it

* The pound of 16 ounces.

* The current price of raw silk, was at that time, twenty-five francs per half killogram, and Mr. Camille Beauvais sold his for fifty. It was produced by that beautiful race called *Sina*, which Louis XVI. obtained from Canton in 1784, and was by degrees changed, in consequence of the negligence and avarice of the first cultivators of this species of silk-worm; but Mr. Poidebard has been enabled, by long and assiduous efforts, to regenerate it in a remarkable manner, and Mr. Camille Beauvais has endeavored to restore it in all its primitive beauty.

(1). It is highly probable, that the apparatus for heating green-houses with hot-water, or the cockle or furnace for warming private houses and public buildings, may be advantageously substituted for Mr. D'Arcet's method. If the theory of Mr. Beauvais should be deemed worthy of adoption in this country, the ingenuity of our enterprising citizens will, beyond a doubt, discover some simple, cheap, and better mode. —*Translator.*

only appears as yet but as an isolated and very recent result, and is at present deprived of that influence, which can only be obtained by its reproduction by different persons, under other circumstances and in other places, and it should also receive the sanction of time. The author of this experiment merits encouragement without doubt; the attention of those who are interested in it ought, at the same time, to be roused, and possibly restrained; new trials appear desirable to the true friends of our prosperity—that is to say, gentlemen, to you all, it is important that those trials be continued, for that which attracted your attention, has also attracted the attention of the able cultivators of the south—strangers to all prepossessions, superior to all prejudices, they await new trials with an eagerness the more legitimate, because they well know, that the experiments which are now making in the north, cannot but be advantageous to the south, which is ready to receive with gratitude new methods of culture which appear to them sufficiently well tested; they know that the industry on which large fortunes are founded in the south, will be able without injuring them, to create like fortunes in the north, and gradually relieve the common country from the tribute of forty-five millions of francs, which it annually pays to foreigners for raw silk; and which the agriculturists of the north, hereafter the emulators and not the rivals of those of the south, will be able, in a quarter of a century, to divide with them, as brothers, the ever increasing fruits of their own industry.

From these various considerations, gentlemen, your committee on agriculture has charged me with the honor to propose to you, that this report be inserted in the Bulletin, and referred to the commissioners on medals.

Approved at a meeting held on the 30th of September, 1835. SOULANGE BODIN, *Reporter.*

Extracts from the Journal of the Franklin Institute.

LIST OF PATENTS ISSUED IN OCTOBER, 1835, FOR IMPROVEMENTS OF MACHINES, &c. TO BE USED IN AGRICULTURE.

With remarks, by the Editor of the Journal of the Franklin Institute.

For a machine for *Thrashing and cleaning clover or rice;* Moses Davenport, Phillips, Somerset county, Maine, October 6.

The machine here described consists of a long trough, containing the feeding, rubbing and other apparatus. It is too complex for verbal description, but its characteristic feature appears to be, the passing of the seed between rubbing boards, covered with perforated metal, or otherwise made rough, the lower board being stationary, and the upper one, as it vibrates, bearing on the seed in one direction only, it being raised in the return stroke.

For an improvement in the mode of *Rearing Silk-worms;* Gamaliel Gay, Poughkeepsie, Dutchess county, New York, October 6. See specification.*)

For a *Chaffing Thrashing Machine;* Russel Bradley, Williston, Chittenden county, Vermont, October 6.

We cannot afford more lines to this apparatus than there are pages in the specification of it. The unthrashed straw is to be laid lengthwise in a feeding trough, where it comes in contact with a revolving cylinder, carrying circular saws, at short distances apart, serving to cut the whole into chaff; it then descends to a thrashing cylinder, and thence passes through a winnowing machine of the ordinary construction. The claim is to the application of the circular saws.

For a *Plough;* William Walker, Washington, Columbia county, Pennsylvania, October 6.

The claim is to "the peculiar formation of the sheath or standard, and the projection on the inner side of the mould-board, which give them sheath, or standard, a leaning position, and cause the plough to take land."

For a *Horse power;* Moses Davenport, Phillips, Somerset county, Maine, October 10.

The claim under this patent is to "the method of construction, or combination, by which the several parts of the jointed platform are put together; of the cylinder heads, and of friction rollers." This combination in most of its parts, exists in numerous other endless platforms; the peculiarities of the one before us ought, therefore, to have been pointed out, as upon these alone could any valid claim be founded.

For a machine for *Hulling and cleaning clover and Timothy seed;* Asa Burgess, and Herman Baldwin, Washington, Litchfield county, Connecticut, October 10.

Ten pages are devoted to the description of this machine, but our remarks upon it will be as brief as the specification is prolix. The feed is to be regulated by sliding-boards, not differing essentially from such as are already in use. The seed is to be rubbed out by a revolving cylinder, furnished with points, or teeth; and below this there is a fan, so enclosed and constructed as to blow the chaff and dust away, without annoyance to the operator. The claim is sufficiently comprehensive, extending to many points in its construction, and also the situation in which it is placed in a building, for the purpose of blowing the chaff entirely out of it.

For a *Gravitation Churn;* Asahel Bacon, Windsor, Broome county, New York, October 10.

There is to be a weight wound up as a maintaining power to a pendulum, a train of wheels

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* The specification of the improvement which is given afterwards at length, describes merely one or more revolving aprons of cloth, something like those of net work, which are sometimes used to convey the straw from a thrashing machine—these being to work under the hurdles on which the silkworms feed, and to convey away the litter which falls through. To our humble comprehension, it seems unaccountable why this invention should have passed without a sarcastic comment from the editor, or why the specification of so trifling a matter should have been afterwards inserted in full.—ED. FARM. REG.

and pinions to regulate the same, and there is a claim to "the propelling of vibrating or dasher churns, by means of a weight, or weights, attached to a gearing of cog, belt or band wheels, or all of them."

For a *Turning Lathe, to turn rake staves, hoe handles, &c.*, James Haven, Newport, Sullivan county, New Hampshire, October 14.

If there is any thing really new in this lathe, the patentee has not enabled us to discover it; the object proposed, that of varying the form of the handle, or other article turned, according to a pattern, is a thing well known. The specification, without the aid of a good drawing, is insufficient for the intended purpose; and that which is called a drawing serves only to "make darkness visible." At all events, a lathe, which would turn such handles most perfectly, may be constructed without violating the rights of any one.

For a *Plough;* Junius S. Tefft, Amherst, Erie county, New York, October 17.

The claims are to "the manner of constructing and using the standard; of applying the landside plate, and the general combination of the parts."

For a *Machine for Propelling Machinery;* David Russell, Tuscumbia, Franklin county, Alabama, October 27.

This is called "Russell's Power Motion Machine," and we suppose that it is intended to gain power, in some way, but how, we are not told and cannot discover. A circular platform of wood which is a flat ring, two feet wide, twenty in diameter, and four inches thick, rests upon steel springs upon this platform, a heavy wheel is to roll, having a horizontal shaft geared into a vertical centre shaft, in the manner of some bark, drug, and other mills. The magic is, no doubt, in the springs, but we have no seer by us to unbind the spell.

The *combination and arrangement* are claimed, and we are told that "this machine may be used to propel all kinds of machinery, and may be propelled by steam, horse, water, or manual power."

For a *Portable Saw Mill;* David Russell. Tuscumbia, Franklin County, Alabama, October 27.

Strange as it may seem, this portable saw mill, although invented by the patentee of the *machine for propelling machinery*, is to be driven by a horse geared to a shaft, in the usual way. A frame is made, which is to be moved about upon wheels, and is to sustain the various parts of the mill, which has nothing peculiar in its construction, excepting it be that the saw is not to be strained in a frame, but the upper end of it is to be acted upon by springs, which are to aid in raising it, in conjunction with the operation of the crank at its lower end. Respecting the use of springs, we refer to No. 8, p. 327; this application of springs is not claimed, nor, indeed, is any thing, excepting "the combination and arrangement of the several parts." which, when there is no novelty, is a convenient mode of slurring the matter over.

For a *Cotton Whipper;* Lucian Osgood, Pomfret, Windham county, Connecticut, October 27.

"What I claim as my improvement, and by which the whipping machine for cotton is facilitated, and rendered more effective than heretofore, is the placing the whip shafts of such machines obliquely, so as to form an angle with the horizon, of twenty-five, or such other number of degrees as may be preferred."

For an improvement in the *Machine for Hulling Cotton Seed;* Anderson Miller, Washington county, Mississippi, and Thomas Laws, Jefferson county, Kentucky, October 27.

This machine is said to be an improvement upon that of Follet and Smith, but the whole arrangement of it is described, without any attempt being made to distinguish between the improvements, and the original machine. Much stress is laid upon the frame being of cast-iron, the gudgeons running into brass boxes, and all parts of the machine being firmly made; there is also an eccentric roller described, by turning which the feed can be regulated. It should be recollected by the patentees, and purchasers of machines, or rights, that, excepting under the authority of Messrs. Follet and Smith, there can be no valid conveyance of the improved machine, any more than there can be of my house by a tenant, because he has improved it.

For an improvement in making *Plough-shares and Coulters;* Samuel A. Sperry, Ann Arbor, Washtenaw county, Michigan, October 27.

The iron is to be rolled, as nearly as may be, into the proper shape; it is then to be converted into steel, and the shares, or coulters, are afterwards to be forged into such forms as may be wanted. The right to do this is claimed, which claim is one of a very questionable character.

For a machine for *Crushing and Grinding Corn;* Anderson P. H. Jordan, Madisonville, Monroe county, Tennessee, October 28.

The crushing to be effected by a twisted bar of wrought-iron, operating like that described by Oliver Evans, as used in mills for grinding plaster of Paris; from this twisted bar, the corn is to pass between a conical nut and shell, of the ordinary form. "The improvement consists in the uniting of the nut to the twisted bar, and upon this union the patent is claimed;" a union which may very well be dispensed with.

For a *Horse Power;* Asa Trahern, Henry Heberling, William E. Lukens, and John Heberling, Short Creek, Harrison county, Ohio, October 28.

This horse-power is of the well known kind in which the animal, walking in a circle, is geared to a lever extending from a vertical shaft; at the lower end of this shaft is a crown, or bevil, master wheel, gearing into a pinion, or wallower, on a horizontal shaft, even with the ground. We cannot find any thing new in the affair; but the patentees claim "the eye of the master wheel and shaft, and the moving pinion, by which means, wood, pot metal, and iron, and consequently, cost, are saved, and its utility greatly increased, whilst it is rendered much more portable." We are told that the master wheel "has a round eye, and runs on a round shaft." And the pinion by which the power is communicated at the outer end of a horizontal shaft, runs in a frame which may be moved round, so as to cause it to stand on any part of the periphery of the wheel which drives it.

These, we suppose, are the things intended to be claimed by the four improvers of the horse power.

For a *Hill Side and Horizontal Plough;* John W. Jordan, Lexington, Rockbridge county, Virginia, October 28.

The claim made is to "the *combination* and *arrangement* of the parts of the described plough, but particularly the *form* of the mould-board, and the manner of reversing it, though no claim is made to the principle of revolving mould-boards," As respects "the *form* of the mould-boards," it is said to resemble "two moutd-boards of the M'Cormick pattern, (a right and a left hand,) united by their upper edges." There are numerous points of detail, showing, by reference to drawings, the particular manner in which the patentee constructs and connects the various parts of his plough; but nothing which bespeaks it superior to other hill-side ploughs, many of which have been patented.

From the Quarterly Journal of Agriculture (of March 1836.)

THE CULTURE OF ASPARAGUS.

By J. Towers, Author of the Domestic Gardener's Manuel, &c.

Asparagus is a native of the sea shores of Britain, though, according to Dr. Hooker, it is rarely found in Scotland: it is worthless in its native original state, but, as every one knows, is susceptible of the greatest improvement by culture, and becomes highly luxuriant in a richly manured, light, and mellow loam. The young sprouting stems, as they emerge from the soil, are used for the table; and these, if suffered to grow, and become fully developed, form one of most graceful among the productions of herbaceous vegetation: the numerous branching lateral stalks, produce innumerable tufted, minute leaves, of the most lively and delicate green; at the angles *(axillæ)* of the smaller branches two or three pendulous flowers are situated; they are greenish, bell-shaped, and without any particular odor. Each flower consists of a calyx of six deeply cut segments—six stamens—one very short style, and its stigma cut into three divisions and a germen, becoming a scarlet globular berry, which contains one or more perfect seeds in its three cells. This plant forms, with others of the same genus, one of the families of the Asphodel tribe, *Asphodeleæ* of the natural system. How, and at what period, the plant was brought into cultivation, it would now be vain to inquire; but it appears probable that, in England, it was little known before the seventeenth century.

The modes of cultivation practised with a view to bring the vegetable to the highest state of perfection, in the different countries of Europe, are too numerous and complicated to be now alluded to, much less described. It will be my aim to point out two processes by which fine highly-flavored shoots may be abundantly produced. The one is not so much in fashion as formerly, but it possesses great conveniences; the other is more novel, and perhaps more scientific, as it may be made to comform to the hypothesis of radical exudation. The physiological reader will readily perceive, that, by adopting it, he can introduce other vegetables between every row of his asparagus, and thus avail himself of the nutritive matters which their radical processes yield to the soil: However, I shall simplify my directions, and confine them to the process of *forcing* early asparagus. These will be brought under one view in the succeeding notice of sea-kale.

Culture in Beds.—This is the method that has been adopted for a number of years, and recommended by most writers; but there exists great difference of opinion as to the way in which the beds ought to be formed. Much of the permanent success will depend upon the nature of the staple soil; and I hesitate not to say, that, unless the garden afford one which is light, loamy, and free from stones of any considerable size, to the depth of two feet at the least, the whole plot ought to be formed artificially, and the best material for the work is the thin turf of a meadow of short growing grass, or that of a common, where sheep abound. Such a soil is replete with vegetable, decomposable matters; and, in fact, is very suitable to the cultivation of every product of the garden, unless it be that of a few vegetables which prefer a stiff soil, or one of an entirely opposite description, and approaching to the nature of sand.

Turf may, however, prove a defective material, if it be produced upon clay or stiff loam; but, in in ordinary cases, that of a common, or sheep-walk is of a medium texture, and breaks down into a rich light earth, which, while it can be digged and pulverized with freedom, is also sufficiently compact in texture and retentive of moisture. If a store of turf, an inch and a half in thickness, could be readily obtained, I should prefer it to any other species of earth whatever. An asparagus bed is not the work of a day; if well laid out and properly planted, it endures for years, and repays any ordinary cost and exertions; but it would be better not to undertake it at all, than to perform it in an unskilful and slovenly manner. If the soil of the plot selected be already free to the spade, deep, and equable, it may be brought into a state nearly equal to good natural turfy loam, by the liberal addition of a well reduced and black leaf-mould. Having thus premised, I would recommend the formation of two beds by the process now to be described: the one will exhibit the progress of the plant from the *seed*, and perhaps will form the most perfect plantation; the other will come into full bearing at an earlier period, but not by any means so much so as many persons are apt to imagine.

Preparation of the Beds.—Select a piece of ground of about thirty feet long, ten feet wide, and open to the full south sun, so that its rays may fall in the direction of the length of the beds. Open a trench, two feet wide at one end, and wheel the earth to the opposite end, or rather to a spot two or three feet beyond it: this implies that the soil is good, otherwise it should be wheeled or carted away, to be employed for other purposes. Have ready, and close by the plot, six cart-loads, at the least, of well-wrought leaf-soil, sea-weed, or, in default of either, of perfectly good spit-dung. If fine turf be employed, one-half of the above quantity of the *enriching substances* will be sufficient. The first and every succeeding trench is to be digged and cleaned out at the bottom, to the depth of two feet or more, as the good soil may indicate. It has been recommended to trench four

and five feet deep, with the assurance that a proportionably great and permanent crop of the asparagus would be produced. I have tried two feet, and thirty inches, and believe that a perfectly well enriched soil to that extent, will be more efficient than six feet of a dead, cold substratum. At all events, a good six-inch layer of rich manure should be laid at the bottom of each trench, and the first being cleared and so prepared, the soil and a due proportion of the manure are to be put into it, and mixed as equally as possible, till the earth be raised at least six inches above the old surface level. Thus the work is to proceed, trench after trench, until the entire plot be filled up with *thoroughly moved and incorporated materials;* the last trench must be filled with earth out of the first. At this stage of the work it will be found that the reserved earth will be insufficient to complete the plot: in order, therefore, to equalize the surface, it will be prudent to dig the bed again in a contrary direction after an interval of a week; and previous to this operation, I would recommend that about a gallon of common salt be regularly sprinkled over the whole surface; it will tend to bring the bed into that chemical condition, which a constant dressing of sea-weed would induce.

Having thus described the preparation of the bed, I observe once for all, that if turf be in plenty it cannot be made too deep; and this will hold good in the preparation of all garden plots where *vegetables alone* are to be grown. For *fruit-trees,* I believe that eighteen inches of pure maiden turfy loam, without one particle of animal manure, over a six-inch stratum of coarse stones, brick-bats, rocky fragments, or the like, would, be a more fertile medium of growth, and one infinitely more conducive to the health of the tree, than double the depth of a highly enriched garden soil. This digression will be permitted, as it includes a general remark applicable to culture in most departments.

The bed thus double-digged will be ready for cropping, and though it might be as well to have thus prepared the soil during the dry weather of the winter, it will yet be in good time if the work be accomplished during the month of March. After the ground shall have settled for a week, two beds, each three feet wide, should be marked out, and this width will admit of an alley between the beds, and one on each side of them, more than a foot in breadth. To form these, strain a line on the outside of the beds, and two down the middle space between them, so as to mark out the limits of the beds, throw the earth out of the alley upon the beds, that their surface level may be six inches above the base of the alleys. If turf be at hand, it would be right to place three inverted well cut turfs the whole length of the alleys, and thus to form good and solid walks; a dressing of salt should then be sprinkled over the turf to prevent the growth of the grass. Some persons use a deep layer of ashes; but whatever be the material employed, the beds ought to be raised a few inches above the walks, not, however, to provide for drainage, but to render the future culture convenient, and to give a finished appearance to the plantation.

Sowing Seed.—Early in April and in fine weather, stretch a line three times up and down the bed, by means of stakes driven into each end, exactly one foot apart, and the like distance within the sides; draw three drills an inch and a half deep, with the angle of a hoe, and make the bottom of each drill even, by pressing into it lightly a straight even pole, like the handle of a long rake. Scatter asparagus seed as regularly as possible along the drills, or if the the seed be known to be good, three or four seeds may be carefully dropped at inch distances, in spaces nine inches apart: the ultimate object is to obtain one good plant, at every space of nine inches, therefore the good sense of the gardener will guide him so to manage the seed-sowing, as to combine economy of seed and time with security of result. Bad seed taken out of very old berries may perhaps scarcely produce one plant from twenty grains, though the seeds will remain good for three or four years.

When the young plants germinate they should be permitted to grow to the height of three inches, or till the leaves become perfectly developed, and it appear which plant will prove strong. If two arise close together, one should be removed as soon as possible, by means of a flat, sharp-pointed stick, and the whole should be thinned out early, so that there may be a space of two or three inches between plant and plant. The spaces between the rows must be kept clean by passing a flat or Dutch hoe cautiously over the surface, and as the plants acquire strength, they may be thinned out to four inches apart; but it would be rather imprudent to attempt a more severe thinning-out during the first year, and till the winter pass over, as it will be impossible to decide to what extent extreme moisture of ground, frosts, snow, and other enemies, may prove destructive during the torpid season. If the plants stand the winter well, the supernumeraries may be employed to great advantage; but of the use to which they may be turned, and, indeed, of the treatment of the seed-bed during autumn, nothing need now be said.

Planting Asparagus Beds.—This is the method usually adopted, and plants two years old from the sowing are generally recommended. I believe that the age is of little consequence as far as security may be considered; and that three or four year old plants may be employed, when it is the object to obtain produce within the period of twelve or fifteen months. Yearly plants are safe also, and these may be planted four inches apart in shallow trenches, or open drills cut with a spade along lines stretched very tight, and at the distances mentioned before. The plants should be placed so deep as to permit the crowns to be covered with two inches of fine earth, and the roots ought to be let down to their full extent into the ground in a rather open and expanded order, and be perfectly coated, and in contact with the soil. Dry weather at the close of March, or early in April, should be chosen; because the earth, when it is in a free and open condition, may readily be made to fall among the stringy processes of the roots; but when planted, each row should be liberally watered once, to fix the plants securely, and to enable them to start into growth without any loss of time. The routine culture of the beds will be in all respects similar to that before described; and if blanks occur in consequence of the decay of some of the roots, they may be filled up with young growing plants, as late even as the middle of June; provided that each be raised from the seed, or nursery-bed, without injury, and be set

immediately during cloudy weather, or in the evening, and copiously watered. The second method of planting, with a view to forcing, will be described hereafter. I defer any farther observations for the present, as respects the general routine culture, merely remarking that, from *seed-beds*, in carefully prepared ground, I have cut very good asparagus in two years, that is, in the third season after the sowing.

From the Farmer's Magazine.

METHOD OF ASCERTAINING THE RICHNESS OF MILK.

Many considerations render it a matter of great importance, in rural economy, to ascertain the richness of milk with facility and precision. The richness of this fluid depends principally on the quantity of oil or butter, and curd or cheese, which it contains.

The relative quantities of these valuable ingredients, in the milk of different cows, may be discovered, with an accuracy more than sufficient for all useful purposes, by ascertaining the specific gravity of the milk, in different states. The beads invented and manufactured by Mrs. Lovi, of Edinburgh, afford the readiest way of trying these specific gravities; and the method of using them is the following:

Pour fresh drawn milk into a glass vessel. and as soon as its temperature falls to the 60th degree, as shown by a thermometer plunged into it, discover, by trial, a bead which will remain suspended in any part of the liquid. For this purpose, first introduce number 24; and if it rise to the surface, remove it, and try 25; if it swim, try 26, and so on, until a bead is found which does not rise to the surface, nor yet sink to the bottom, but continues stationary in any part of the liquid. The number upon that bead denotes the specific gravity of the milk, and is to be carefully noted. A quicker way consists in throwing all the beads at once into a larger vessel of the milk; probably some will sink, and some swim. The one which remains suspended, indicates the specific gravity. If none be in that situation, then observe the last bead that swims; and the first which sinks, and the number intervening between them, is the specific gravity. Thus, if 25, 26, and 27 swim, and 28, 29, 30, &c., sink, 27½, which is the number intermediate between 27 and 28, expresses the specific gravity. *Next*, allow the milk to stand for 24 hours, or till all the cream has risen; after removing it, bring the skimmed milk to the temperature of 60°, and ascertain its specific gravity in the manner already described.

As the oil, which has separated in the form o cream, is the lightest ingredient, the specific gravity of the skim milk will be found greater than before; and the larger the quantity of cream, the greater will be the difference of specific gravity.

This difference, therefore, affords a sure indication of the relative quantities of oily matter or butter.

Thus, if entire milk possess a specific gravity of 29, and the skimmed milk, on one occasion, have a gravity of 35, but on another of 32 only, the difference, in the first case, amounts to six degrees, and, in the second, to three degrees; and the milk of the first example will afford nearly twice as much butter as that of the other, and so on, in every other proportion.

Or, if one milk at 30, have its specific gravity increased to 34, by the removal of the cream, and another at 28 rise to 32, then, as the differences are the same, the quantity of butter which they will afford, will be nearly the same.

In this manner, the relative quantities of oil, contained in milk, is discovered; and, to ascertain the proportions of the curd or cheese, curdle such a quantity of the skimmed milk as will afford a sufficient quantity of clear whey; then bring it to the temperature of 60 degrees, and ascertain its gravity.

As the curd is a heavy ingredient, the specific gravity of the whey will be found to be less than that of the skimmed milk; and the larger the quantity of the curd, the greater will the decrease be.

The difference, consequently, in the gravities, affords an indication and measure of the relative quantities of curd.

Thus, if skimmed milk stand at 36, and the whey in one instance at 32, and in another at 34, it may be inferred that the first will yield about twice as much cheesy matter as the second, and so in all other proportions.

It is most accurate to try the specific gravities of the milk, in all its states, at the temperature of 60. But, if any circumstance prevent this being done, and they are tried at any other temperature, then, for every four degrees of deviation from the 60th degree of temperatnre, make an allowance of one degree of specific gravity; and, if the temperature be above 60, add the allowance to the number actually found; if the temperature be below 60, deduct it.

Thus, if the milk possess, at temperature 68°, a specific gravity of 28, as the excess of temperature above 60° amounts to 8 degrees, or twice 4, make an allowance of two degrees on account of the temperature, and add them to the 28; consequently, 30 will be the number of expressing its specific gravity, at the standand temperature of 60°.

Again, if the trial be made when the milk is at temperature 52, and the specific gravity be found to be 32, make the allowance of two degrees, but deduct them from the amount found, and the remainder, or 30, will denote the specific gravity.

It has been found, from experiment, that the Beads applicable to the different kinds of milk examined, are the following.

Womens' milk, from - -	30 to 38
Cows - - - -	24 to 34
Asses' - - - -	34
Goats' (house-fed) - -	34
Cows's milk, when the cow was fed on grass, before being creamed, was 32; after the cream was taken off - - - -	40
The milk of ewes, also grass-fed, was 36 before it was creamed; and after the cream was taken off, it was - - - -	48
Mares' milk was found to be -	36

Note.—It appears that womens' milk, and asses' milk afford scarcely any cream.

Advantages of the beads.

The advantages to be obtained from this mode of discovering the richness of milk, are so obvious as scarcely to require enumeration.

1st. It affords an easy method of estimating the value of a milch cow. By taking into view the quantity of milk, and its quality, the merits of the animal may be justly determined.

2d. It affords the best means of judging of the fitness of a cow, for a butter or cheese dairy.

2d. It affords ready means of trying the effects of particular kinds of food upon the milk of cows.

4th. It affords means of determining the value of particular pastures.

5th. It affords excellent checks upon the fidelity, as well as the skill and attention, of the dairy servants.

N. B. It is proper to observe, that these beads indicate the real specific gravities, and are made to speak the common language of science, by adding 1000 to each number; thus, a specific gravity of 30, as expressed by these beads, means 1030 in reference to the gravity of distilled water, taken as 1000.

From the Farmers' Magazine.

ON REAPING CORN [WHEAT] AT DIFFERENT STAGES OF MATURITY.

The reaping of corn at different stages of ripeness, has lately excited a good deal of discussion amongst practical farmers; and the subject is of so much importance that it is no wonder it should have done so.

An innovation upon long-established custom is seldom popular. And, from the history of fallow—the two-horse plough—the thrashing machine—and the scythe-hook—it would appear that there is something either in the existing state of society amongst farmers, or in the peculiarities of their profession, which renders the introduction of an agricultural change slow and difficult.

Although the utility of reaping corn before it attains full maturity has at present a host of opponents, yet, if it is founded upon just principles, it will ultimately prevail. Indeed, the practice has been slowly gaining ground for many years past; and it may be predicted, without pretending to the gift of prophecy, that the practice will soon become general in all our best cultivated districts.

The two principal objects to be attended to in the reaping of corn, are the quantity and quality of the produce; and, when endeavoring to point out the proper stage at which corn ought to be reaped, my observations are intended chiefly to bear upon these two objects, and, if possible, to connect them together.

As culmiferous crops approach maturity, their grains shrink and become hard, loose in the chaff, and apt to drop out upon the slightest agitation; the straw stiff, white, and sapless, with the ear curved towards the earth. And when these changes have taken place, the crops are said to be completely ripe; and in former times they were seldom reaped until arrived at this state of maturation.

In opposition to the ancient practice, a modern one is recommended, called green cutting, the advantages of which are numerous and important. The term green cutting, however, must be used in a restricted sense, as it is obvious there is a certain stage of maturity, previous to which it must be injurious to reap corn.

Corn is said to be green cut, when the straw is full of sap, of a greenish hue, except the part immediately below the ear, which is commonly yellow; the grain soft, but not milky; and the whole plant is perfectly pliant. However, corn ought sometimes to be reaped before the straw immediately below the ear becomes yellow; because in cold and cloudy weather, the circulation of the juices is often stopped, even when the straw appears green; and the proper stage at which corn ought to be reaped, now and then depends upon different circumstances, such as situation, state of the weather, time of the year, &c., a knowledge which can only be acquired in the school of practice.

All practical farmers agree that our common culmiferous crops die downwards; indeed, a careful examination of the plants, during the latter stages of maturation, will convince any rational individual of this truth. The ear, which is the extreme part of the plant, first assumes the hue that indicates decay; then, that part of the stalk immediately below the ear; and the change gradually proceeds downwards. The curvature of the ear, or inclination downwards, which the plant invariably assumes when it has reached maturity, is alone decisive that the plant dies downwards; because, if the under part of the stalk ripened first, it would first become weak, and consequently unable to support the heavy unripened ear. The wisdom of Nature is beautifully displayed in the dying of the plant, and curvature of the ear. By the plant dying downwards, the lower extremities retain sufficient strength to support the curved ear until the grains drop out and replenish the earth. Were the under part of the stalk first to die, the ear would fall prostrate and prematurely to the ground, and the grains would perish in the chaff. It therefore appears, that the grains of culmiferous crops have reached maturity before the curvature of the ear takes place; and all that is obtained by waiting until the appearance of this symptom, is the ripening of the straw.

Since corn dies downwards, it is clear that, as soon as the circulation of juices ceases in that part of the stalk immediately below the ear, the grains cannot derive any benefit from the rest of the plant, far less from the earth; consequently, to delay reaping corn when it has arrived at this state, is certainly losing time, and unnecessarily exposing it to the vicissitudes of the weather, without obtaining any advantage whatever. Nay, corn may even, with propriety, be reaped four or five days before reaching this state, because, during the time in question, the juices are scarce, and their circulation languid. Besides, when corn is reaped stored with juices, the process of maturation goes on for some time after; a fact which may be supported by many illustrations. The flower of red clover, after it is cut down, long remains fresh when kept in the shade, and during moist weather seems even to flourish. Every species of fruit ripens, as well as matures its seeds, after being plucked before it has reached maturity; and corn is not an exception. Experience has fully convinced me, that the process of maturation

goes on after corn is cut down in a green state, and that the color of the grains is never injured thereby, though sometimes, from being bound together, and excluded from light and air when in a green state. Practical farmers, who are gifted with observation, must frequently have witnessed a whole district apparently unfit for the sickle, become, in the course of four or five days, perfectly dead ripe through the agency of good weather. Surely such corn might have been reaped with safety at the commencement of so rapid a change.

All who have reaped corn when it was completely ripened, and those who have superintended the reaping of it, must be well aware that many of the best grains drop out in handling the corn during the cutting process, as well as in the after operations, which is entirely owing to the openness of the chaff; that it is difficult, if not impossible, to prevent many stalks and ears from falling to the ground and being lost, which is owing to the stiff sapless state of the straw; and the finer the quality of the grain, the greater the loss from these two circumstances. Indeed, after an early harvest, such as that of 1821 or 1822, the loss became manifest from the grains vegetating upon the ground. The grains of completely ripened wheat and potato-oats are extremely apt to drop out; and the ears and stalks of ripe barley are most liable to be lost in cutting; and probably the late varieties of oats suffer least from being allowed to stand until perfectly ripe. But corn of every description suffers a diminution of produce from the effects of over-ripeness.

When corn is reaped before it arrives at maturity, the swollen state of the grains, and the closeness of the chaff, prevents any loss during the reaping process, as well as in the after operations; while the pliant state of the straw enables almost every stalk to be collected by careful reapers.

Though, if corn is allowed to be completely ripe before it is reaped, there are few inferior grains; yet a loss is generally sustained by good ones dropping ont; and if corn is reaped before it has attained full maturity, there is no loss of good grains, but a considerable increase in the number of inferior ones; so it would appear that there is not much difference, in point of good grain produce, between ripe and green reaping; but that there is a quantity of inferior grain in favor of green reaping; and should a gale of wind intervene between the time of green and ripe reaping, the advantage, in point of produce, would be greatly in favor of early reaping.

I believe Mr. Coke was the first individual who maintained, that to reap wheat before it reaches maturity, actually improves the quality of grain; and the reason assigned by him for doing so is, that as soon as wheat arrives at a certain stage of ripeness, part of the nutritious qualities goes from the kernel to the formation of bran. So, according to Mr. Coke, completely ripened wheat has more bran and less flour, than that which has been cut in a green state. This theory is certainly ingenious; but my want of experience as a manufacturer of flour and bread, prevents me from giving a decided opinion upon the subject. Were I, however, to judge from the impression which the external appearance of the grains convey, I would say, after having carefully examined the produce of a variety of experiments, that the difference of quality between wheat that has been completely ripened, and that which has been reaped twelve or fourteen days before that stage, is from one to three per cent. in favour of ripe wheat; and when there is six or eight days between the time of reaping, there is no difference of quality. But instances frequently occur in which green cutting certainly improves the quality of grain, or at least prevents it from becoming worse.

When wheat is much lodged, and overgrown with grasses, or excluded from the influence of air during a continuance of damp weather, it is apt to become discolored, and even to sprout. In such cases, early cutting speedily removes the ears from their perilous situation, and exposes them to a free circulation of air, which is always attended with good effects.

It is well known, that during damp weather, matured grain sprouts even when standing erect. And from the experience of sowing, it has been ascertained, that dry matured grain sprouts sooner than that which is damp and unmatured. Then early cutting has a powerful tendency to prevent sprouting; and it is possible to cut down wheat, and, with the aid of a favorable day, to secure it in a stack before it has arrived at a state liable to sprout.

Green reaping certainly improves the nutritive qualities of straw; and by enabling farmers to extend the time usually devoted to reaping, it would, if the practice was pretty generally adopted, enable them to do with fewer reapers, which would consequently lessen the harvest expenses.

From the foregoing observations it would appear, that by reaping corn eight or ten days previous to its becoming perfectly ripe, the quality of the grain is not injured—the quantity of grain is increased—the grain in some degree secured from the effects of wind and rain—the straw improved in quality—and the expense of harvesting lessened.

If the sun, wind and rain, were under human control, and all the ears of corn could be plucked from the straw and gathered together by the hand alone, then I would be in favor of allowing every species of corn to reach full maturity before reaping it. But when the variable and uncertain state of British weather, as well as the enumerated advantages attending green reaping, are taken into consideration, I do not hesitate to recommend the practice of green reaping to the serious attention of all practical agriculturists.

C. C.

3*d June*, 1834.

From the Quarterly Journal of Agriculture.

THE CULTURE OF RHUBARB.

By J. Towers.

My notice of this exquisite vegetable shall be comprised in a few lines; but these, I trust, will avail to extend its culture more and more; for any thing more productive, salubrious, profitable, and expressly suitable to the purposes of the cottager, can scarcely be found in the entire list of vegetable productions. A few years only have elapsed since the rhubartic hybrid, *green* rhubarb, was cultivated for tarts, and held in very slight estimation; but since the introduction of the larger (giant) varie-

ties, the demand has increased with surprising rapidity. Of the two sorts which I earnestly recommend, one is called, if I mistake not, *Radford's Scarlet Goliah;* and the other is a small *red* variety, which is crimson throughout when boiled or baked. These will supply the table from April to August, and suffice for every purpose.

Culture.—Let the ground be prepared precisely as for asparagus beds. Select clean offsets, with two or three bold eyes: the first week in March is a very suitable season. The eyes or buds of the Goliah will be of a deep, rich red, hence its name: the leaves, however, and stalks are green, though of different hues, and the latter are spotted and streaked with red. In the smaller *pink* variety the red tint prevails throughout.

The plants of the great Goliah should be set firmly in the soil, five feet apart, or five feet one way and four feet another; the smaller kind may be set three feet asunder, plant from plant, giving a free watering to each to settle the soil among the roots; Dry weather, an open condition of the ground, and a temperate, unfrosty state of the air, should be preferred. When the growth becomes established, the ground must be kept free from weeds; and if dry weather supervene, water ought to be freely given around the roots, two or three times, with intervals of four or five days.

Not a leaf or stalk ought to be touched during the first year; and in autumn, when the leaves are all decayed, they should be laid in little trenches formed along the centre of the spaces between the rows, sprinkled with a handful or two of salt, and covered with the earth that had been digged out. Thus the plant will itself furnish a portion of the manure that will annually be required. As winter approaches, a coating of well decomposed stable manure or leaves, or a mixture of both, two or three inches deep, should be laid round each plant, to the extent of two feet; and in the open weather of February, the whole bed must be forked over.

As a proof of the excessive productiveness of the *Scarlet Goliah*, I need only mention, that, in the second week of March, 1831, twelve plants were set in ground prepared for asparagus. In June, the leaves met, and the whole plot was covered. In 1832, the plants yielded profusely, many leaves measured above a yard and a half over the surface, the footstalks being an inch and a half broad, and from two to three feet long. The outside leaves were, as required for use, stripped off by an oblique pull, not cut; the family was amply supplied till July and August, and yet the plants increased; the neighbours also were furnished with *leaves* throughout the summer, and with *offset plants* in the succeeding spring. During the two past seasons the root stocks increased to such a size, that, when it became needful to remove some, it required a barrow to contain the weighty mass that was raised, after great labor, from the soil. If any one try the experiment in favorable soil, and with any thing like judicious management, he will scarcely fail to discover that the growth and production of the plant will exceed every demand that can be justly made upon it.

From the Quarterly Journal of Agriculture.

CULTURE OF ARTICHOKES.

By J. Towers.

Artichoke (Cynara Scolymus) Syngenesia Polygamia Æqualis (Cl. xix. ord. 1.,) *Linnæi;* tribe Carduaceæ; among the *Compositæ* or the compound flowers of the natural "*Jussieuan*" system, is, as the tribal name implies, nearly related to the thistles; the observant natural physiologist must be aware of this from the imbricated order of flowering, and the dense close head which contains the bluish flowers, and the seeds surmounted by a feathery down *(pappus.)* In England, the full heads only are eaten boiled; these heads consist of a fleshy receptacle, on which the flowers and their bristly appendages are based; and of an alternating series of scaly bracteas or floral leaves *(involucrum,)* that are furnished with a pulpy substance at and above their point of union with the base.

Culture.—All that has been previously said as to the preparation of the ground for the asparagus, will apply to this valuable autumnal vegetable: it delights in a rich and light soil; therefore a sandy turf will supply the appropriate medium of growth. *It is propagated by suckers* or offsets taken from old plants, and planted in March and April, either in a bed of three rows, four or five feet asunder, the plants three feet from one another, or in single rows between other vegetables. The soil ought to be previously digged and laid even; and the line, being strained very tight, each sucker should be planted by the dibble or garden trowel, and fixed securely in the soil. Nothing tends so effectually to promote the growth of any sucker or offset as to place its base, and the lower parts or joints of its stem, firmly in recently moved ground. The vital principle thereby becomes stimulated, and, to speak chemically, is acted upon by the electro-gaseous products of the soil at the moment of their developement. Water, if the weather and soil be dry at the time of planting, ought to be then freely given around the plants, and, subsequently, more than once, in order to fix them in the soil, and prevent stagnation of the vital fluids.

The subsequent culture consists in keeping the ground clean and moderately open; and, at the approach of frosty weather, to draw earth about the stems, as in landing up celery, but not bringing it to so acute a ridge at the top. Artichokes may be abundantly produced in the autumn of the first year; some plants will not, however, be prolific. The fruit ought always to be gathered, and the stems cut close off prior to the winter earthing up. In the second season the plants will become abundantly more prolific, and great care should be taken to preserve them from extreme frost by straw, haulm, or evergreen boughs, laid upon the ridges of soil so as to form a sort of roof over the herbage; but these coverings should be removed in rainy weather. The heads may be preserved throughout the winter and early spring months, by inserting the lower ends of the stems in sand, under shelter of an out-house, or cool dry cellar.

The artichoke plant produces abundance of suckers, which ought to be detached in March—not in the torpid season, and of the best of these, fresh plantations may be formed. We suggest, on the ground of the doctrine of *radical excretion*, that, if the plants stand in single rows widely apart, between which a rank of potatoes, beans, or peas, be grown—the new suckers be planted on the site of such crops, in order to reap the benefit to be derived from the matters ejected into the soil by their excretory organs, and by the actual deposition of detached vegetable fibres.

Thus artichokes and annual crops may be made every two or three seasons, to alternate or "rotate" with each other.

From the Quarterly Journal of Agriculture.

THE CULTURE OF SEA-KALE.

By J. Towers.

Sea-Kale (Crambe maritima) is found on our sea-coast; it belongs to that natural order which includes all the cruciform flowers (*Cruciferæ*:) the stamens are six in number, two of which are shorter than the others; hence the plant is classed in *Tetradynamia*, and is found in its first order, *Siliculosa;* the seed vessel or "pouch" is round, smooth, and about the size of a black currant. The root of the native plant—according to Sir J. E. Smith—is large and fleshy, much divided at the crown. *Herb* very glaucous (*sea-green*,) smooth, rather succulent. *Stems* several, from one to two feet high, branched, spreading, leafy. *Leaves* stalked, spreading, or deflexed, large, undulated, and toothed, of a leathery ("*coriaceous*) texture; the lowermost somewhat lyrate; the rest roundish acute." *Flowers* in dense terminal clusters, milk-white, yellowish in the centre, *fragrant*. This description accords sufficiently with the appearance of the cultivated plant; and in fact, it is known that the inhabitants of the countries where it grows wild on the shores, have always been in the habit of observing the first progress of the young shoots as they emerge from the sand, and of cutting them under the surface. In this state they are merely a species of green kale; but by culture, the shoots become a most delicate vegetable, which, while it precedes aspsragus, combines much of its peculiar flavor with that of the best borecole, or *chou de Milan*. *Sea-kale* was introduced to the gardens about seventy years ago; it is now found in all the best establishments; and its culture, though peculiar, is as easy as the plant is prolific. It can be raised from seeds, and be brought to the table early in the second year. By transplanting, and division of the shoots and roots, it may be propagated abnndantly, and at any season of the year, and is so hardy as to withstand any common degree of frost. The *soil*, as indicated by its native situation and habits, should be light and sandy, with a slight addition of mild lime, muriate of soda, and wood ashes. The beds ought to be prepared as for asparagus; and of a light sandy turf, with a natural manuring of sea-weed alone—or artificially, with one-fourth of a compost consisting of perfectly reduced fern, or leaf-mould, nine parts—wood-ashes, one part—and about half a pound of common salt to every barrow-load of the compost. This last chemical compound contains a large proportion of the components of sea-water, and the wood ashes yield carbonate of lime in its most effective state, also some carbonate of potassa, and fine silex. Three barrows of light sandy turf, and one barrow of the above compost, give proportions which promise to yield a medium of growth of the most permanent and effective character. In it sea-kale and asparagus might be grown for forcing, either side by side, or in separate plots: the treatment of the one would be applicable to the other, and therefore one description will suit both. I only observe, that, if neither turf nor sea-weed can be obtained, good kale can be produced in any light garden soil, trenched in the manner before described for asparagus beds, and manured copiously with wood (not coal) ashes, and the prescribed quantity of common salt. All the difference in the two beds is this, that for *sea-kale*, or forced asparagus, the plot of ground should be large enough to permit the plants to stand in *single rows* three or four feet apart. The rows may be of any required length according to the quantity likely to be consumed. Supposing that six or eight rows, each twelve feet long, be required, then the ground is either to be trenched twenty inches deep at the least, or digged out and replaced with the enriched turf; and the work ought to be completed before March, so as to become settled by the middle or latter end of that month. Between every row there should two stakes be set up at each end, two feet asunder; these will mark the *beds* and the *spaces* between them; thus there may be eight beds and nine spaces or divisions. At the time of *sowing* the beds—(I greatly prefer seed to plants)—leave a space on the outside of two of the outermost stakes, and strain a garden line exactly along the middle of the bed immediately within, and next to it; and beginning at one end of the line—but a foot within it—make a small ring or circle with the finger, an inch deep, and three inches wide; or what is better, force a circular piece of iron or wood into the ground to the required depth, and drop three seeds in the ring so formed, equidistant, and at right angles with one another. Form and sow the rings about fifteen inches asunder—centre from centre, the whole length of the line; then cover the seeds to the surface depth with sand, and pat it to a level with the flat of a spade; one row or *bed* will thus be sown. Leave the adjoining *space* of two feet vacant; and proceed to the bed or division next beyond it: sow that, and proceed in the same alternate order till the plot be completed; when a space exterior of the last sown division must be left, and it will then be found that whatever be the number of divisions sown, that of the unsown *spaces* will exceed it by one. The plan thus laid down is grounded upon the practice of the celebrated Bath cultivators; and nothing can exceed it for the facility it affords to good tillage, and orderly, convenient forcing. It must be apparent to every one versed in horticulture, that *asparagus* can thus be sown or planted, and be cultivated—*for forcing*—with every advantage afforded to sea-kale, as will be further shown in the detail.

If the seed be good, the season propitious, warm, and moist, germination will rapidly advance, and when the plants appear, they may be secured from vermin by sprinkling around and within them a good covering of wood-ashes (three parts,) blended with soot and powdered lime, of each one part. If weeds arise and threaten to surmount the plants, they must be kept under by surface-hoeing to the depth of an inch, with the "Dutch," or thrust-hoe. Perhaps three plants will rise from each ring, and these, indeed *all* that grow, must remain till they begin to interfere with each other; then, one only, the strongest, must be left, and the others drawn, or raised up; so that a complete row of single plants, from 1 foot to 15 inches apart, finally remain. The young supernumeraries may be set out in rows, to grow for succession, or be

thrown away if no more stock be required. The plants in the rows will grow luxuriantly, and become very large, so much so as, in all probability, to come in contact, forming one connected line of sea-green foliage. All the culture during the summer and autumn, will consist in keeping the *beds* clear from weeds, and in digging alternate *spaces* two or three times, to the depth of 9 inches, so as to pulverize and render the soil as fine as possible. At the two last operations (say in July and October,) it would be as well to incorporate with the soil a two-inch layer of decayed leaves, mixed with one-fourth part of pure wood-ashes.

The reader will be very careful to avoid sea-coal, or even pit-coal ashes. It formerly was the custom to cover sea-kale with conical hills of those ashes during winter, and one out of three or four plants perished, the damage being ascribed to mice, or moles. I never have lost a plant since I left off that acrimonious chemical compound, styled ashes, nor could I, by any means keep my bed entire, while I employed it. Its destructive influence has at length been admitted, and sea-kale now enjoys a regular growth, and repays its cultivator. No *forcing* ought to be attempted during the first winter; but it would not be amiss, after clearing off all the old leaves, to strain a line along the edges of the beds, and cutting the earth by it three inches deep, to mould up the *two-feet beds* with the earth taken to that depth from the intermediate spaces. A tall marking stick should, however, be placed near the centres of the plants. After the "earthing up," a blanching-pot, wooden box, or old bee-hive, is to be set over every plant. A straw-hive is indeed an excellent material. It is sufficiently strong, warm, and impervious to light, even when used alone, without leaves, for blanching. A small, or even a very tolerable gathering of fine white kale will be the result of this treatment, earlier or later, according to the season and climate; and, in cutting it, the knife should be passed below the surface of the stratum of soil that was added, so as to bring up each full-sized shoot in a compact state, and not in detached leaves. The smaller sprouts ought not to be cut; and, when all the large ones have been taken, the superposed soil should be drawn back into the *spaces*, and the whole plot reduced to an even surface-level. This work will, it is presumed, be performed about mid-April, and then a knife, or very sharp-edged spade, should be passed through the shoots, so as to cut off every one that rises above the original level of the bed. This cutting will induce the plants to send forth a number of fresh shoots, and prevent, in a degree, the protrusion of flower stems. The routine culture of the second season will comprise *weeding* with a flat hoe, *digging* and *enriching* of the *spaces*, as before directed, and the immediate *excision* of every flower-stem that may be sent up.

Forcing.—(These directions will apply equally to asparagus in single rows, by the second method.) After the leaves of the sea-kale, and stems of asparagus have become inactive, remove the former, and cut off the latter. Mark each sea-kale plant with a tall stick, dig and mould up the beds with fine earth from the spaces, as in the previous season; but now, and in each succeeding year, dig out, and remove to a spot at hand (as convenience may point out,) the earth of each space, on the sides of those rows which are to be excited, so as to leave trenches one foot deep. The plots ought to be so contrived as to furnish three distinct forcings, the *first* to commence late in November, to be cut at the close of the year; the *second* about the first week in January; and the *third* early in February. A *fourth* reserve ought to come in at the natural season, *blanched*, but not *forced*, in April. The trenches are to be filled to the level of the tops of the line of pots or covers with tree-leaves, blended, if possible, with one-third part of fresh stable manure. When this level is attained, the pots, and spaces between them, must be covered to the depth of two feet with the same materials; but for asparagus, *which can have no pots*, leaves alone are recommended to the depth of 18 inches. If shallow boxes or troughs, formed of three strips of boards fastened together, and five or six inches deep, could be inverted over the whole line of asparagus, the mixture of dung and leaves might be safely employed.

The bed of fermenting material, in either case, ought to form a compact mass of equal depth; and this it would be advisable to cover with straw, hurdles, or thatch, to keep out excessive rains, and to retain the developed heat. Trial-sticks should be thrust deeply into the masses; and if these, on being withdrawn, feel gently warm, the work of forcing will proceed regularly; and kale and grass will be procured in succession from Christmas to the end of March; to be succeeded by the crops from the unexcited bed. After forcing, and clearing off the leaves, &c. the trenches are always to be filled up, and the surface-level restored. The slight difference to be observed in treating these two delicious vegetables, will soon be sufficiently obvious to every cultivator of discernment, and need not be alluded to at this time.

From the Farmer's Magazine.

SIR JOHN SINCLAIR'S CODE OF AGRICULTURE.

A new edition, being the third, of this work, has just appeared, which, at such a time as this, when agriculturists of all descriptions are so much depressed, is a proof of the high estimation in which it is held by the public. The present edition will be found still more valuable than either of the former. It is improved, both by what has been withdrawn, which indeed is not much, and by what has been added; while the whole work has been carefully revised and corrected, both in its doctrines and its reasonings. Sir John, we perceive, is now almost, if not altogether, an entire convert to the sentiments of Mr. Coke and some others, in regard to the drilling of corn of all kinds, and, with a few exceptions, upon all soils. On this point, perhaps, his opinions may not be assented to by many intelligent farmers in Scotland, who, though they would not object to the general principle, still do not think, that, in our climate, and especially upon strong clays, drilling can be adopted so advantageously as upon the light soils, and with the earlier seasons of Norfolk; or that it can ever be generally substituted for broad-casting in this part of the island. It is certainly true, however, on the other hand, that it might be carried much farther than it has ever been with us, with a fair prospect of ample remuneration for the additional expense required, par-

ticularly on lands much infested with annual weeds, and on such as are to be sown with grass seeds. As the subject has been much discussed of late, and is in itself of no small importance, we shall give the worthy Baronet's sentiments on it, as they appear in this edition of his work; and we can assure our readers that he has taken great pains to procure the best information.*

DRILLING CORN [OR WHEAT, &c.;] WITH OBSERVATIONS ON THE ROW CULTURE, FOR CROPS OF GRAIN.

The question, whether it is most expedient or profitable to raise culmiferous crops according to the broadcast or drilled system, has agitated the agricultural world for a number of years; and as it is a point respecting which there still exists a great diversity of opinion, it may be proper here to detail the arguments on both sides, that the reader may be enabled to form a decided opinion, which ought generally to be preferred; and in what particular cases either the row, or the broadcast system of culture, ought to be adopted.

The arguments against drilling are, 1. That it is not likely to be profitable on a small scale, on account of the expense of the machinery for the different operations of sowing, hoeing, &c.; 2. That these operations must often occasion delays incompatible with the hurry of an extensive autumnal or spring sowing—at least in wet seaasons and on wet soils, however little it may be felt in dry seasons and on dry soils; 3. That the drill machine does not answer where the soil is too full of small stones to allow the coulters to sink to a proper depth, and of course, that the seed is not sufficiently covered to produce an abundant crop;§ 4. That it is not so well calculated for steep lands;† and, 5. That the grain is more liable to be shaken by winds, and the harvest to be later on drilled fields, than on those which are sown broadcast; and consequently, that is not so well calculated for a windy and a northern climate.

Some other objections were formerly urged against drilling, which the recent improvements in the system have effectually removed. For instance, it was anciently the practice *to earth up the plants*; the consequence of which was, that, in rich soils the vigor of the soil was exhausted on the stems or foliage, instead of the fruit; and though the straw was strong and abundant, the grain was often defective in quality, or greatly diminished, in quantity; whereas, now, it is a maxim in the school of Holkham, '*That white straw crops will 'be injured, if earthed up upon any soil.*'‡

It is likewise urged, that it might not be practicable, in many districts, to find a sufficient number of laborers to hoe the drills, were all the crops on a farm to be subjected to that process. But, in the present state of the country, with an overflowing and unemployed population, a new source of occupation to the peasantry would be most desirable, provided their employers were remunerated for the expenses they incurred;* and, where there is a scarcity of male laborers, women and boys have, in many of the agricultural districts, as in Gloucestershire, been taught the art, and have been found most expert at hoeing.

It has further been urged against the use of the drill machine, that where seed has been steeped, and encrusted with lime, as a preventive of the smut, the lime destroys the brushes, and impedes the regular delivery of the seed. But this objection is easily removed, by using *cups* instead of brushes, or by steeping the seed in a solution of the sulphate of copper, in a mannner to be afterwards described.** The seed, in that case, might be sown in a few hours after the solution has been applied, *without lime*, and with a certainty of preventing smut.

The introduction of the drill system is, by numbers of the most distinguished agriculturists, considered to be the most important of all modern improvements, and to be well entitled to universal adoption. It is principally recommended on the following grounds. 1. That the broadcast system is a less perfect, and a less economical mode of cultivation than that of drilling; for the seed can neither be deposited in the soil with the same exactness, in regard to depth, regularity, or proportion,† nor be so placed that the crop can afterwards be improved in its progress to maturity.†† 2. That in light soils, drilling has the important advantage of giving the grain *a good hold* of the ground, and of giving all the seed the same depth of soil,‡ by which the frost is prevented from throwing out the plants in spring, or the wind from loosening the roots, after the stem gets high, or when the ear is filling. 3. That by the improved practices in drilling, the use of manures is both encouraged and economized, so as to diminish the quantity necessary, and to increase its powers, by bringing it into immediate contact with the plant;§ and that a heavy crop of drilled corn, where the weeds are thoroughly destroyed, will be found much less in-

* Having the 5th edition of the Code of Agriculture before us, it has been used in part, as more full than the 3d edition, to copy the following article.—ED. FAR. REG.

§ The use of '*The lever drill*' removes this objection.

† This objection is obviated by an addition to the machinery. The seed-box is fastened on a pivot, or by a screw; and the position of the box is adjusted to the ascent or descent, without any difficulty.

‡ Communication from Mr. Blaikie at Holkham. Yet *in very poor soils*, it may be expedient to try the effect of earthing up, with wider intervals, so that the hoeing will not injure the surface roots. In rich soils, it would be decidedly injurious. It was only on that point that the author entertained any doubt as to the utility of drilling, which the new practice, of avoiding earthing up, has removed.

* Remark by Edward Burroughs, Esq.

**Inserted in Farmers' Register at p. 337 vol. 3.—ED.

† It is a great advantage to place the seed at a proper depth, so as to secure a sufficient degree of moisture to promote germination, and to make this deposition uniform, that the grain may spring and ripen more equally.

†† Dickson's Husbandry, vol. i. p. 466.

‡This is an advantage peculiar to drilling; for, when crops are *ploughed in*, some of the seed will go to the bottom of the furrow, some will be left half way, and some will even be left at the top. In fact, the depth of seed, when ploughed in, unless well executed, is often more irregular than when harrowed in.

§On a field sown in drills 12 inches apart, which received one hoeing in spring, a more productive crop, and by far more valuable grain was raised, than on a broadcast crop, which had received three times the quantity of dung. The manure for the drilled crop of wheat was applied in drills made by the plough, the seed sown, and then harrowed down.

jurious to the fertility of the soil, though raised with less manure, than the same crop grown broadcast, with a greater quantity of manure, but incumbered with weeds. 4. That it gives an opportunity for cleansing the ground, even when the crop is growing—of completely extirpating annual weeds—of checking the growth of root-weeds—and of preventing weeds in general from being injurious to the crop. 5. That if the land is not hoed, but hand-weeded, less damage will be done to the crop, by the weeder's feet passing *between* the rows of plants, than by *treading upon them*, as must inevitably be the case when working promiscuously over the ground. 6. That the progress of the grain, after the scarifier has worked upon the soil, is attended with the most beneficial effects.* 7. That drilling is peculiarly calculated *for inferior soils*, and brings their produce more nearly on a footing with that of fertile land, than could otherwise be obtained.† 8. That the pulverization of the soil between the rows of autumn or winter sown wheat, is of the greatest benefit to the clover seeds sown in spring; and that the admission of air between the rows is of use to the corn crop.‡ as well as to the grass seeds sown with it. 9. That drilled crops of white corn, from the greater strength of their straw, are less apt to lodge, or to be beaten down in wet seasons;§ and are much less subject to other casualties, in particular to the diseases to which wheat is unfortunately liable. 10. That the expense of cutting down a drilled crop in harvest, is uniformly less than that of one which is sown broadcast, since three reapers will do as much work in the former case, as four in the latter. 11. That drilled crops are more equal in growth, and in general, better in quality than the broadcast. And, 12. That drilling may be of use in regard to the grub and other vermin. The hoeing in spring may assist in destroying them; or, at least, by the treading of the hoers, and the stirring of the soil by the hoes, a check may be given to their depredations.

In regard to any saving of seed, which by some is considered an advantage, Mr. Coke of Holkham is decidedly of opinion, that such an idea is founded on erroneous principles, and that any economy of that sort ought not to be attempted. It is indeed of use to have the roots matted together, if there is substance enough in the soil to nourish the plants; and it is found, that wheat thrives best on a firm and compact bottom, which prevents the roots from being long and straggling.

Innumerable instances might be brought forward, of heavy crops having been produced under the drill system, by those who have bestowed much care in trying the experiment; and it has often answered, even on a great scale, when properly executed. But its success must depend upon the intelligence attention, perseverance and capital of the farmer.

As it has been carried to the highest perfection, and cultivated to the greater extent, on the farm and on the estates of that distinguished agriculturist, Mr. Coke of Holkham, it may be proper to give a short account of his practice. He uses the Rev. Mr. Cooke's drill, which is drawn by a single horse, and sows six rows at a time, and an acre in an hour. His wheat he sows at nine inches asunder, his barley at six inches three quarters. The quantity of seed which he sows per acre, is three bushels of barley, and six of oats. In regard to wheat, the average quantity which he prefers, is four bushels per acre. By depositing such a quantity of seed, there is no occasion to earth up the plants, for the sake of promoting tillering. On rich soils, it is the practice, to draw the drills from north to south, because the rays of the sun, when in his greatest altitude, striking directly between the rows of corn, have a powerful effect in strengthening the straw, and by absorbing the damp from the earth, become a powerful auxiliary in preventing mildew. On poor soils, on the other hand, the lines should be drawn from east to west, if the nature of the ground will admit of that plan being followed. Cooke's fixed drill-harrow, is used once in spring, the hand-hoe is used twice, the land is cleared of weeds, but the soil is not earthed up, nor accumulated against the corn. The hoeings cost about twenty pence each, per acre. The largeness of the crops, particularly of barley, and oats, raised even on poor land, under this system, is hardly to be credited, and they are sometimes also of a superior quality.

A great improvement has recently been made in drilling, by the introduction of "The Inverted Hoes," invented by Mr. Blaikie. They consist of a pair of blades, for each interval, going one before the other, and each having *the heel* turned to the row. This disposition of the blades prevents, 1. *Cutting the plants, or their roots;*—2. *moulding up;*—and 3. *Clogging*. They may be used, though the rows of corn are only nine inches distant from each other; and it is found, that the occasional trampling of the horse on the young plants is not attended with injurious consequences.

It was formerly believed, that drilling was only applicable to light soils; but in Suffolk, strong or heavy land is now cultivated for spring crops, in drills, in a most perfect manner. The ridges are

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* Communications from J. C. Curwen, Esq. M. P.

† Mr. Blaikie at Holkham states, that it is no uncommon circumstance to have from inferior land in Norfolk, rented only at from 15 to 30s. per acre, as much produce as from land that, in other districts, pays from £5 to £6 per acre. From land of an inferior quality, paying only 20s. for rent, and 5s. for tithe, 41 bushels of wheat per acre have been obtained, under the drill system.

‡ It is absurd to suppose that the access of *air*, so essential to the growth and health of plants, should not be of service to the roots of plants, if means could be contrived (as it is the case under the drill system) by which its access can be obtained.

Where soils are *very poor*, the plan adopted in the cultivation of turnips ought to be extended to grain, that of placing the manure in the centre of a drill, and sowing the grain above it.

§ This has been doubted; but the drillists are, in this point, supported by respectable authority. The Rev. Adam Dickson, in his Treatise on Agriculture, vol. ii. p. 61 and 62, remarks, 'That weeds keep the air from the roots of corn, and thereby expose it to be lodged.' He observes, in another place, 'That when corn is sown in rows, with intervals, the admission of air strengthens the stalks, which prevents the corn from lodging.' vol. i. p. 526. Besides, it is well known that, when corn is lodged, it suffers less, if it has been drilled, than the broadcast, there being, between the rows, an admission of air which tends to dry the stems, and to render it sooner fit for being harvested.

all carefully ploughed in autumn, or early in winter, to *the exact breadth*, which suits either one movement of the drill machine, or two. In the spring, the land is only scarified or harrowed, as it has been rendered thoroughly friable by the winter's frost, and the corn is drilled, without a horse's foot treading any where, except in the furrows between the ridges. Unless this practice is adopted, it would be difficult, in very wet seasons, to carry on the operations of the drill system, on heavy soils, with the regularity and exactness that are necessary.

In other parts of England, as in Kent and Hertfordshire, the drilling of strong lands is practised, for winter as well as spring crops; and Mr. Childe in Shropshire, drills all his crops, on the most adhesive clay, and in a hilly country, with the greatest success.

The propriety of drilling in Scotland, shall be discussed in the Appendix, as, owing to the peculiarities of the soils and climate of that country. it is necessary to enter more into detail, than with reference to England.

Besides drilling, &c. as above described, there are other modes by which grain can be cultivated *in rows*. Sometimes, by means of a drill-roller, a number of ruts are made at the distance of from eight to ten inches apart, over the whole of which, the seed is sown broad-cast, and swept into the hollows by a brush-harrow. In this way wheat has been raised on light lands, where otherwise it would have been impracticable.

There is another mode of cultivating wheat in rows, called "*ribbing*," which is much practised in Northumberland. As soon as the ground is properly prepared, it is made up into small ribs, by a single-horse plough. The seed is then sown broad-cast among the ribs, or a person with a barrow-drill, goes along every rib, and drops the seed along the bottom, which is covered by a light harrow, drawn straight up and down the ridge. In either case, the plant makes its appearance nearly at the same time above ground; nor is there any difference, in this respect, between the two systems. The mode of ribbing is a simpler process than that of drilling; it may be executed in worse weather; the expense of a drilling machine is saved; and the crop may have all the advantages of hoeing, as if it had been drilled. But it does not suit all soils and rotations, or previous crops; for instance, strong clayey soils cannot be sufficiently pulverized for that purpose, nor can ribbing be successfully adopted with clover ley, unless it be twice ploughed, and thoroughly harrowed.

To those however, who are accustomed to *plough in* their seed, the drill barrow, either attached to the plough, or following it in the furrow, pushed on by a boy, would at once establish the row-culture, without difficulty, and with little expense, over an extensive tract of cultivated land in England. The advantage of this simple improvement, can hardly be sufficiently appreciated. *Annual* weeds would be extirpated, and root weeds checked: and without dwelling on the immediate advantages of the system, the observation is perfectly well founded "were it even admitted, that drilled crops are not at first superior to the broad-cast, (the contrary of which has been found in numerous instances,) yet in a succession of years, the progressive effects of constant hoeing will render the drilled ones greatly superior."

The cultivation of culmiferous crops *in rows*, may therefore be justly accounted the best method hitherto known of raising crops of corn; and by promoting at the same time, the destruction of weeds, of preserving the fertility of the soil.

It is an additional reason for recommending drilling, that it would lead to habits of accuracy and neatness in all the other branches of arable culture; whereas broad-cast sowing encourages those slovenly practices, which still prevail but too generally in farming concerns. There is every reason indeed to believe, that the system would become general, were it once admitted to be *an established maxim*, (which the information above detailed sufficiently justifies,) that drilling corn, like drilling turnips, is superior to broadcast. Farmers would then prepare for it, by furnishing themselves with the necessary implements, and by dressing and cleansing the soil, with peculiar and minute attention. There might still be some exceptions, as on very strong clays, or in very unfavorable seasons; but these exceptions, as in the case of drilling turnips, would become every day less numerous. Our fields would then be cultivated with the same regularity and neatness as our gardens, and would become equally productive.

On the whole, such is the importance of the drill system, that its general adoption ought to be promoted as far as is practicable. Models or engravings of the simplest, and best machines, and directions for their use, ought every where to be circulated, and liberal encouragement given to those, who will prove, by accurate experiments, in districts where it is at present either entirely unknown, or but little practised, the utility of the system, and the profit to be derived from it. By the extension of drilling, inferior soils might soon be rendered nearly as productive as those naturally more fertile. In many cases also, by the introduction of this system, naked fallows might be abolished, where at present they are unnecessarily practised; and by these means, a treasure of solid and permanent wealth, in useful and valuable produce, might be rapidly spread, over the whole surface of the country.

From the [Edinburg] Farmer's Magazine.

ON THE MAKING AND CURING OF BUTTER.

Extract from an Essay by William Aiton, Esq.

The directions given by your correspondent as to milk-houses, appear to me to be correct; and I humbly suggest, that the proprietors should provide their tenants in proper milk and dairy-houses. I see no reason, however, for placing such houses far from either the kitchen or the byre, or entirely separated from the other buildings; provided that the effluvia from the byre do not reach the milk-house. When at a distance from the byre, the milk may be injured by exposure to the weather, in passing from the byre to the milkhouse. The milkhouse ought to be screened as much as possible from the heat of the sun, to be roofed with *turf* and *thatch*, and by no means with slates or tiles. The rays of the sun should never be allowed to enter the milkhouse.

Your correspondent observes correctly, that the cream and milk should be passed through a sieve

or search. But I would have that done when the cream was about to be churned, and the milk when ready to be coagulated for cheese. If it is strained when newly drawn from the cow, the milk is hurt by agitation, and more exposed to the air than is necessary; and every chemist, as well as every dairywoman, will attest, that the cream always rises better when the milk has been least agitated, and the froth raised in milking preserved. The froth raised on the milk by a good milker, spreads over its surface in the coolers (provided the milk has not been much agitated,) and protects the aroma and most valuable qualities of the milk from the exhaling powers of the atmosphere; in the same way that ale and porter throw up a sort of cream, to protect themselves from atmospheric influence. On that account, no skilful dairymaid will either pass the milk through a search until it has cast up the cream, nor yet use a pail in taking the milk from the byre to the coolers. The more milk is agitated, and especially when warm from the cow, the sooner will it sour, and the more rancid will the cheese and butter become. I would, therefore, have the milk emptied from the milker's cog into the coolers, and searched when about to be churned, or the curd set. One of the advantages derived from young animals being suckled, instead of being fed from a dish, is, that none of the aroma, or most volatile qualities of the milk, are lost.

Your correspondent also recommends, that the milk shall, '*when cool*, be put into sweet well-seasoned oaken cogs, keelers, or milk-pans.' But, with submission, I would recommend to place the milk in these coolers or stand-vats whenever it comes from the cow, and *before it has cooled*. If the milk remains in the milker's cogs, which are deep and narrow, till it cools, and is then turned over into the milk-pans or coolers, it will be much longer in cooling, and more agitated, than when placed in the coolers at once. And if it is put into one vessel to cool, and into another to cast up the cream, the injury will be still greater. The sooner that the milk is cooled after coming from the cow, and the less it is agitated, the better. In well-managed dairies, and when the weather is hot, a small quantity of cold spring-water is put into every one of the coolers, in order to cool the milk the sooner, and make it cast up the cream; for when milk is strong and thick, it does not cast up its cream so well as when it is thin, though the cream of thick milk is richest. To obtain the richest butter, first drawn milk should be laid aside, and only the cream that rises first churned.

The coolers may be made of oaken wood, or earthern ware well leaded; or, what is still better, they are now made of iron, well tinned in the inside, and with a sort of paint on the outside, that prevents them from rusting. Mr. Baird, at Shott's Iron-work, has manufactured great numbers of these iron coolers, and they will soon supersede the use of those made of wood. The iron ones are only about the same price as those of wood, and they are more easily cleaned, cool the milk sooner, and will last far longer than wooden dishes. If the paint on the outside, or tin within, should fail, they can be replaced at a small expense. The milk ought to be placed about three or not more than four inches deep in the coolers and to stand from twenty-four to thirty-six hours, if the whole cream is wished for. In the dairy districts, the milk is now generally placed into stone cisterns, so large as to hold the whole milking; and the milk is let out by a trap-hole at the bottom, and the cream received into a separate dish. But these cisterns are not suited to small dairies.

Your correspondent also directs, that the cream should always be churned when it is '*fresh*.' To this I object for two reasons. First, it is only in very large dairies that the cream can be churned while it is fresh. The milk must stand from twenty-four to thirty-six hours in order to cast up the cream, and after that is removed from the milk, it will be difficult to keep the cream fresh twenty-four hours more; so that to churn it fresh you cannot get more than two days' cream into the churn at once; and in most of the dairies I saw in Aberdeenshire, the cream of two days' collection would not fill a water-stoup; and not a few of them would require a churn still smaller. This would greatly multiply the labor for no useful purpose. But, second, if churning the cream fresh were more easily accomplished than it is, it can serve no good end to practise it. Sour cream makes as good butter as that which is churned fresh. In fact it is quite impossible to make butter from cream till it is soured. You may commence the operation of churning while the cream is fresh, but it will, and must be sour before the butter is formed; and it is better to allow it to sour in the natural way, than to force on acidity by agitation in the churn. Natural souring does no injury to the butter, but improves it; while rendering the cream hastily sour, by severe agitation, softens and injures the butter by too much heat. In the improved butter and butter-milk district round Glasgow, the whole milk as it comes from the cow is churned, and the greatest pains are taken to have the whole milk and cream soured and coagulated (lappered, as they call it) some days before it is churned; and the butter in that district, and made in that way, is, *cæteris paribus*, equal to the best in Britain. No dairy farmer in that district would, on any account, admit a single pint of milk into the churn that had not been soured and coagulated for some days. Neither would they allow it to sour otherwise than in its natural course. When fresh or sweet milk is churned, an unnatural fermentation is forced upon it, and that leads to putridity much sooner than when the souring is is brought on in the natural way. I agree with the directions given in the communication referred to, that milk yielded by cows during the two first days after calving, should not be mixed with other milk, or churned. The first drawn milk after the cow has calved will, no doubt, yield three times as much butter as ordinary milk. But that milk is so much disposed to putridity, that even the butter extracted from it cannot be wholesome. And it has such a high red color as to render other butter freckled when mixed with it.

I surveyed last summer many dairies in the counties of Dumfries and Cumberland, where vast quantities of butter of the greatest celebrity is made for the London market, and I did not find one farmer who churned his cream fresh. They all collect their cream in earthern-ware pitchers, or wooden coolers, for at least a week, and some ten days and more. Some of them stir the cream once a day or two days, with a wooden spurtle, to keep it from clotting and throwing off the serum, and others do not stir it at all. Either way may

do, but I am rather partial to the plan of stirring, if the cream is not churned soon after being taken from the milk.

The directions given by your correspondent for churning, washing, and salting the butter, seem to me to be correct; only I would recommend, by all means, to mix in the salt soon after the butter is churned and well washed, and, at any rate, before it becomes quite firm. If once butter has consolidated it is much injured by being again beaten or trodden soft, or baked in a paste; and even when that is done, the salt cannot be so easily and completely mixed with it as it would be when it has been merely cooled a little, but not become firm. If the salt is not completely and equally mixed through the whole mass, the butter becomes darker in color where the salt rests, and whiter and rancid where it has not reached. This is termed *pyety* butter, which always sells at an inferior price.

Mixing old and new butter together, or even that of different qualities, or from many different dairies, some of it good and some of it inferior, is bad management, as that of the worst quality will contaminate the best. A little leaven will in that case leaven the whole lump.

Your correspondent wishes the salt to be kept dry till it is used, but not to be placed near the fire, lest it should become tinged with smoke; but I do not know how salt can be kept dry without artificial heat: And I must enter my protest against placing new lime under or near the butter, as he directs, or even in the same apartment with it.

I concur in opinion with your correspondent, that cream should not be scalded; but as, in making butter (as in every other chemical process) the utmost attention should be paid to temperature, I beg leave humbly to offer my opinion on the degrees of heat that I conceive to be proper for milk in all its stages, from the time it is taken from the cow till the butter is churned and salted.

While milk is in the coolers to cast up the cream, it should be kept as nearly as possible in a temperature of about 50 or 52 degrees on Fahrenheit's scale. In summer it may sometimes be difficult or even impossible to keep the milkhouse at a temperature so low; but great care should be taken, by excluding the sun and hot winds, frequently washing the floor with cold water, &c. to keep it cool. When the pavement is washed it should be well dried with a cloth, so as the milk may not be injured by the exhalations from the wet floor. But too much heat, at this stage of the process, ought not only to be avoided, but great care should also be taken to prevent the milk from being at any time too cold. If the milk is kept too warm, it does not cast up the cream, and soon becomes putrid; and when it is kept too cool, the butter is white, and of inferior quality, with little flavor, and neither unctuous nor rich. It is not enough that the temperature of cream be raised before or during the operation of churning; it ought to be kept at all times in a moderate degree of heat, and, if posible, in an equal temperature.

If the cream is in about 54 or 56 degrees of heat when put into the churn, it may be churned without any application of artificial heat, and the agitation in churning will raise it to the temperature of 70 or 74 degrees, at which butter is formed. But if the cream is colder than 54 degrees, I would advise the application of artificial heat to raise it to about 56 degrees, or more. This may be done by placing the cream over night in a warmer atmosphere, or by mixing into it a portion of hot water. But the most proper course is, to prevent the milk and cream from ever becoming too cold. If hot water is mixed into the cream to raise its temperature, it should be poured in by one person, while another is churning, so as it may not melt the cream. Hot water so applied has been objected to, because it was thought to impair the color and quality of the butter. I would not pretend to say that the water can improve the butter. On the contrary, the butter is often of too white a color where much hot water has been put into the churn. But this does not proceed so much from the water so applied, as from the milk or cream having been previously too cold. If the temperature of the cream were to be raised, by placing it near a fire, or otherwise, without any admixture whatever, or by long and severe agitation in the churn, still the butter would be white, brittle, and of inferior quality. The manufacturers of butter and sour milk in the vicinity of Glasgow, instead of raising the temperature of the milk and cream (for they churn both together) by agitation, uniformly raise it from the temperature of the milk house to nearly that at which the butter is formed, by the application of hot water; and yet their butter is of the very best quality, and of good color. When the milk or cream is too cold at the time of churning, it emits a hard rattling sound when agitated, appears of a white color, and throws up innumerable white bubbles. But as it acquires more heat, either from agitation, or from whatever cause, the sound becomes softer and more *soughing*, the milk or cream assumes a darker, yellower color; and as the butter begins to form, and to rise to the surface by churning, which brings on a fermentation of its own kind, the whole mass acquires a yellow color.

It is necessary, however, to guard against raising the temperature too high, during the operation of churning, otherwise the butter may be much injured even by agitation alone. The process of churning should be conducted slowly; and the more so, if the temperature of the milk or cream has been much above 55° when begun to be churned. In that case, and where but a small quantity is churned together, the churning should not be carried on more than three or four minutes at a time, so as to occupy nearly two hours in churning even a small quantity, and still longer where the quantity churned is large.

Whenever the butter is completely formed, it ought to be instantly turned into fresh and cold spring water; and after being slightly stirred or mixed into the water with a large wooden spoon or skimming dish, so as the whole butter may be reached by the cold water, and part of the milk may be washed out, the butter should remain in the water about ten or fifteen minutes, so as it may become somewhat firmer before the operation of washing. I say *somewhat* firmer, but not by any means to become completely cold and firm, till it has been well washed and salted. It would be wrong to beat or knead the butter too much while it was very soft; but as it can neither be properly washed, nor the salt well mixed into it, except when it is salt, there can be no propriety in making it cold and firm, by long immersion in cold water, and then to soften it for washing and salting,

by tramping or baking, or otherwise. It is much better to finish these processes before the butter has been completely hardened. Three or four changes of water, with a small quantity of salt in each, are necessary to separate impurities from the butter; and the butter must be well stirred and minutely mixed with a wooden spoon into the water, to render it clean; but it should not be beaten by human hand or foot.

The butter, whenever it is duly washed, should be instantly salted, the salt well mixed equally into every part of the mass; and whenever that is done, the butter should be compactly kneaded into a cask, and covered over on the surface with a wet cloth, if the cask is not full.

As I write this from memory, and at a distance from my notes, I cannot well say what quantity of salt ought to be applied to a given weight of butter. So far as my recollection goes, half an ounce of salt, two drachms of sugar, and two drachms of nitre, to 16 ounces of butter, is the proper mode of curing. The sugar improves the taste, and the nitre the color of the butter; and both of them act with the salt in preserving the butter from becoming rancid.

If the butter is churned, washed, salted and stored in the manner I have pointed out, and brine kept in the casks, it will remain free of rancidity for nearly twelve months; whereas the Aberdeen butter generally becomes rancid by the month of January after it is made. The Irish butter is in good condition till the month of May, and well cured Scots butter still longer.

All these processes are so simple and easy that every tenant in Aberdeenshire may understand them, and by reducing them to practice, they may both make and cure their butter as well as the inhabitants of other districts; and by doing so, the article would come to market much improved, while the farmers would draw the whole profits themselves, instead of sharing them with the curers. The curing of the butter is one of the easiest operations of the dairy. If a person can wash butter, they may also salt it; and if the butter is not washed till it reaches the curers, a week or more after churning, the milk and impurities must have by that time contaminated the butter to such a degree that no after-washing can completely remove.

For the Farmers' Register.

SOME OBSERVATIONS ON HOUSEKEEPING—THE DUST REMEDY.

Wardsfork, Charlotte.

As the housekeeping department has been rather too much overlooked of late, and of course the ladies slighted, I have chosen a subject which the fair reader may find interesting and useful. Housekeeping is the twin sister of agriculture, and so much alike, that you can hardly tell one from the other. The greatest distinction between these fair goddesses, is, that the men in all civilized times have paid their homage to the one, while the women have bowed submission to the other. As housekeeping is the sphere allotted to these fair ones, and as this is the principal theatre upon which they display their excellencies and virtues, surely it should be celebrated in the annals of husbandry. 'Tis true that mere housekeeping does not claim such a portion of the money-making exertion; but it has no small share in the money-saving operations. The accumulation of estate may be more dependent on agriculture, but our comfort is more involved in housekeeping. The gold of mountains, the pearls of oceans, will not compensate for the loss of that domestic comfort which is the result of neatness, order, and taste, which is displayed by the wife, whose "price is far above rubies." Compared with these industrious, useful and dignified matrons, how little are the vain and idle butterflies of fashion that are continually buzzing abroad in the summer's sun of folly, and dissipation. But to the point.

As dust is one of those annoyances, against which every neat woman has declared war, in whatsoever shape it may come, I herein offer my services to aid them in subduing so foul an invader of their peace and happiness. Many schemes have been devised, in all times and places, by the heroines contending for the palm of neatness; but the most successful has not been able to rout this vile intruder from the parlor. Hewed timbers, brick and stone walks, shoe-scrapers, mats and millstones, have all had their day, but all have proven unavailing. With great pleasure I announce to the public in general, and to the ladies in particular, that the subtle foe is at length vanquished by most simple measures; for which discovery I expect to be much honored by the good housewives, which I think more of than the highest praise that could be bestowed on me by all the host of politicians of either party, for any political achievement. The discovery is just this: Fill the walks leading from your styles, garden, kitchen, to the dwelling house, with saw-dust of heart pine, about four inches deep. Its sponginess will keep it dry; it will readily take the mud from the shoe, and every rain will wash the deposite through the mass of saw dust to the bottom, keeping the top clean, and it will last for years. In this way you get rid of dust in the house; for observe, dust gets into your house, first in the form of mud conveyed in on the shoe. There is only one inconvenience attending it: some of the saw dust will find its way into the house, but it is much more easily and pleasantly removed than dirt. It looks clean, and has an agreeable smell when fresh. What great labor it saves in the articles of rubbing and scouring, and prevents, in a great measure, the confusion in flying from dust every morning, whenever the broom is touched, or be stifled to death—and then the bad coughs, and consumptions it prevents, and cases improperly called cases of poison. I verily believe, many people die of dirt. I have gone to places before now, where, on retiring to bed, and lifting the coverlet, I have been nearly thrown into a quinsy, by rousing the sleeping dust which had gathered about the bed. And what clouds of dust arise from moving a carpet; and when cautiously removed, you may write your name with your finger on the floor off of which it is taken. This is all brought about by not guarding the outposts of the chamber by suitable walks, such as I am recommending. What scolding and bawling, and rattling of bells, and fluttering of turkey wings it would save, (if those simple means were used,) which are almost as bad as the dust itself! For no decent woman can hold her peace while her eyes and nose are weeping and sneezing, from being filled with dust; and no man can be easy while his wife is in pain. And, alas! the poor servant maid

that is doomed to the broom, every morning of her life, she seems in some sort to be fulfilling the decree, 'dust thou art, and to dust thou shalt return." Every lady, of improved mind, sets a high value on her library: how can she endure to have her neatly bound volumes soiled with dust? But the gilded cover, the elegant type, and the purest sentiment, are not secure from the intruder, and even the family Bible is not exempt from its all-defiling approaches. The waxed floor, the bright furniture, the washed apparel, are all in their turn assailed by this enemy of neatness, so that it may be considered as the most formidable impediment in the way of comfortable housekeeping, and the greatest pest of the well-bred lady. Now the saw dust which I am recommending, spreads an air of neatness, purity, and brightness, through every department of the mansion house, dispels many an angry look, promotes health, cherishes love—in short, it imparts new vigor to all the domestic virtues.

I. R.

A NEW MODE TO DESTROY CATERPILLARS.

To the Editor of the Farmers' Register.

A Yankee friend mentioned to me a mode he had adopted of destroying caterpillars, that he found effectual, which I thought might be new to some of the readers of the Farmers' Register. It is, to blow up the whole colony with a gun loaded with a light charge of powder, choosing such times as they are in their nests. He says, it is sport for the boys, who are willing to do the shooting, he finding the powder. The muzzle being put close to the nest, not one escapes.

W.

From Jacob's Travels in Germany.

AGRICULTURAL ESTABLISHMENT AT MOEGELIN, IN PRUSSIA.

About twelve or thirteen years ago, the king of Prussia, who, like his uncle, was always anxious to extend and improve the agriculture of his dominions, invited Von Thaer, who resided near Lunenburg, and whose celebrity was even then great, to settle in his kingdom, to assist in diffusing agricultural knowledge, and, by his management, set an example to the other great landed proprietors, which might stimulate them to adopt similar improvements. His majesty also wished him to conduct a seminary, in which the knowledge of the sciences might be applied to husbandry, for the instruction of the young men of the first families.

The estate of Moegelin was given to him to improve and manage, as a pattern farm. It consists of eighteen hundred Berlin morgens, or about twelve hundred English acres. At that time the annual value was estimated at two thousand rix-dollars,* but is now supposed to be worth twelve thousand; but some part of that increased value must arise from the buildings that have been since erected. The principal improvement, that of the soil, has arisen from the large flocks of sheep, which in summer are folded on the land, and in winter make abundant manure, in houses constructed for their lodging.

* A rix-dollar is a small fraction less than 3s.

The Royal Institution, of which Von Thaer is the director, and which occupies a considerable portion of his extensive buildings, has three Professors besides himself. One for Mathematics, Chemistry, and Geology; one for Veterinary knowledge; and a third for Botany, and the use of the different vegetable productions in the Materia Medica, as well as for Entomology. Besides these an experienced agriculturist is engaged, whose office it is to point out to the pupils the mode of applying the sciences to the practical business of husbandry. The course commences in September. During the winter months, the time is occupied in mathematics, and the first six books of Euclid are studied; and in the summer, the geometrical knowledge is practically applied to the measurement of land, timber, buildings, and other objects. The first principles of chemistry are unfolded. By a good, but economical apparatus, various experiments are made, both on a large and small scale. For the larger experiments, the brew-house and still-house, with their respective fixtures, are found highly useful.

Much attention is paid to the analyzation of various soils; and the different kinds, with the relative quantity of their component parts, are arranged with great order and regularity. The classification is made with neatness, by having the specimens of soil arranged in order, and distinguished by different colors. Thus, for instance, if the basis of the soil be sandy, the glass has a cover of yellow paper; if the next predominating earth be calcareous the glass has a white ticket on its side; if it be red clay, it has a red ticket; if blue clay, a brown one. Over these tickets, others of a smaller size indicate, by their color, the third greatest quantity of the particular substance contained in the soil. This matter may appear to many more ingenious than useful, and savoring too much of the German habit of generalizing. The classification of Von Thaer is, however, as much adopted, and as commonly used on the large estates of this country, where exact statistical accounts are kept, as the classification of Linnæus in natural history is throughout the civilized world.

There is a large botanical garden, arranged on the system of the Swedish naturalist, kept in excellent order, with all the plants labelled, and the Latin as well as the German names. An herbarium, with a good collection of dried plants, which is constantly increasing, is open to the examination of the pupils, as well as skeletons of the different animals, and casts of their several parts; which must be of great use in the veterinary pursuits. Models of agricultural implements, especially of ploughs, are preserved in a museum, which is stored as well with such as are familiar in Germany, as with those used in England or other countries. I remarked the absence but of two implements used in this country viz. the mole plough, and a new machine recently invented for sowing small seeds. The first of these would certainly be of little use in most parts of Germany; and the other is so new, that, excellent as it is, its adoption is by no means general, even in England.

The various implements used on the farm are all made by smiths, wheelers, and carpenters, residing round the institution; the workshops are open to the pupils; and they are encouraged, by at-

tentive inspection, to become masters of the more minute branches of the economy of an estate.

It appeared to me, that there was an attempt to crowd too much instruction into too short a compass; for many of the pupils spend but one year in the institution; and thus only the foundation, and that a very slight one, can be laid in so short a space of time. It is however to be presumed, that the young men come here prepared with considerable previous knowledge, as they are mostly between the ages of twenty and twenty-four, and some few appeared to be still older.

The sum paid by each pupil is four hundred rix-dollars annually; besides which, they provide their own beds and breakfasts. In this country, such an expense precludes the admission of all but youths of good fortune. Each has a separate apartment. They are very well behaved young men; and their conduct to each other, and to the professors, was polite even to punctilio.

As I have not had an opportunity of visiting Hofwyl, and have met with no account of that institution written by any person who is well acquanted with many details on the subject of its agriculture, I cannot make a comparison between that widely-blazoned establishment, and the unostentatious institution of Moegelin. I was indeed told that the plan and effects were far inferior; but as my informants were Prussians, I make some allowance for the national vanity, which felt itself piqued that the establishment in Switzerland should be praised most highly, and their Royal Foundation be unknown beyond the boundaries of the kingdom to which it belongs.

From the Silk Culturist.

FEMALE INDUSTRY APPLIED TO SILK CULTURE.

The following facts are not only creditable to the female industry of the country, but conclusively prove that female labor, when judiciously applied, receives its full reward. Last summer a venerable matron of Franklin county, Pa. seventy-six years of age, with the aid of a girl, in five weeks made and sold silk to the amount of $60, besides attending to the ordinary duties of her household. Two young ladies in the same county, in about six weeks, made silk, sufficient for 4000 skeins of sewing silk, which at five cents a skein, amounted to $200. There are growing in the town of Hebron in this state, eight white mulberry trees from ten to twelve years old, from which silk was made the last summer by two young ladies of Mansfield. They spent five or six weeks in Hebron, and, after paying all expenses of board, &c. carried home $60. Another young lady in Mansfield made silk the last summer at the halves. She made and reeled in nine weeks twenty pounds, worth at least $4.50 a pound. By this it will be seen that her share amounted to $45, and that she received $5 a week for her labor.

We might go on and state facts of this kind *ad infinitum:* but these are sufficient to prove that female labor, when applied to profitable objects, receives a liberal remuneration. Philanthropists have expatiated at great length, and with much good feeling, on the deplorable condition of females on account of the depressed price of their labor—they express, and no doubt feel, a tender sympathy for females dependent on their labor for support; but, like most others who make less pretentions to sympathetic benevolence, are prone to suffer their commiseration to evaporate in prayers and good wishes for an amelioration of their condition, instead of prompting them to laborious exertion in devising and maturing plans for their relief. It is true, female labor, when compared with male, receives a small compensation; but at the same time it must be admitted that it will always command an equivalent for the value of the services rendered. This disproportion in price grows out of the nature and profits of the object on which labor is bestowed, rather than the amount of skill or physical power rendered. The value of skill and strength is materially diminished by its being inappropriately applied. The skill of a miniature painter would be worth but little if applied to the tarring of fruit trees to prevent the ascent of insects, or the strength of a Hercules, if devoted to embroidery or other needle work, requiring mere dexterity and skill. The only way in which females can increase the value of their labor, is by seeking out objects, on which to bestow it, which yield to themselves and their employers greater returns of profit. Among these, the culture and manufacture of silk is a prominent one. The services of a healthy female in rearing the silk worm and reeling silk, are worth as much, and will command as high a compensation as those of the most athletic male; but their labor would command but a small price if applied to building stone wall in New England, or clearing the forests of the West,—and for the best of all reasons, it would be misapplied and consequently worthless. The secret of rendering male and female labor valuable and ensuring it an adequate and equitable reward, consists in applying it to objects, not only valuable in themselves, but which are capable of being made the means of accumulating wealth.

From the Silk Culturist

ENCOURAGEMENT OF SILK CULTURE AND MANUFACTURES IN THE NORTHERN STATES BY LEGISLATIVE BOUNTIES.

The act lately passed by the legislature of Massachusetts, giving a bounty of $2 on every pound of raw silk grown and reeled within the commonwealth, is one of those master pieces of state policy for which her legislators have long been distinguished. Though it is highly creditable to the intelligence of the members, and the amount disbursed under its provisions will bring forth its "hundred fold;" yet there are probably some, making high pretensions to a thorough knowledge of political economy, who will consider it a profuse, if not a wanton and wasteful, expenditure of public treasure, and be disposed to censure them for a reckless disregard of the public interest. A narrow and short-sighted policy would doubtless condemn the law, and all appropriations made under it, as a profligate expenditure of the people's money; while at the same time the political economist, who takes an enlarged and enlightened view of the consequences which must inevitably result from it, will pronounce it the perfection of political wisdom. A detail of the circumstances under which the law was passed, and its effects upon the

agricultural and other interests of the state, will show that we are not mistaken in our ideas concerning it.

The culture and manufacture of silk has for a time been engrossing the attention of most of the States in the union, several of which have been endeavoring to introduce and foster it by legislative bounties. In this new enterprise Connecticut led off, by offering a bounty of $1 on every hundred mulberry trees, and 50 cents on every pound of reeled silk. This gave the business a little start, and made Connecticut the most favorable State for engaging in it, on account of the bounty, all other advantages being equal. Massachusetts followed, by offering the same bounty on every pound of reeled or thrown silk. Vermont, seeing Connecticut and Massachusetts filling up with mulberry trees, and inviting the growers of silk to settle within their limits and avail themselves of their liberality, endeavored to attract their attention towards her genial soil and climate, by offering them a still more munificent bounty. An act giving a bounty of 10 cents on every pound of cocoons made within the State, was passed at the last session of the legislature. Maine, also, finding that her soil and climate were adapted to the cultivation of the mulberry, and rearing of the silk worm, and not being content with the avails of her lumber and granite, invited the silk grower to visit her, and as an inducement, in addition to the low price of lands, offered him a bounty of 5 cents a pound upon cocoons. New York was also enticing the Yankees to leave New England and settle in some part of her vast dominions. With these offers before them the silk growers were balancing in their minds the comparative advantages and disadvantages of these respective States, when Massachusetts magnanimously comes forward, and offers them $2 a pound for every pound of silk they will grow, reel and throw, within her jurisdiction, during a period of seven years.

This offer will settle the question, unless the other States pursue a policy equally liberal, and present inducements equally flattering. Without these, Massachusetts will become the great silk growing and manufacturing district of the United States, and wealth will flow in upon her with a flood tide. The bounty will pay all the expense of making the cocoons and reeling the silk, and leave the $4 or $5 a pound, for which it is readily sold, nett profit to the grower and reeler. With this encouragement in Massachusetts, what company or individual will even think of purchasing land in any other State for a plantation? But the consequences will be favorable in other respects. In the first place it will enhance the value of real estate. All lands exclusively devoted to the culture of silk, will be so much withdrawn from other agricultural purposes, and leave the remainder at a proportionably increased value. The manufacturing population of Massachusetts is sustained, at least in part, by the products of her soil; and as this is circumscribed in its limits, its value per acre must rise in the same proportion; and hence every farmer will feel the beneficial influence of the law, though he may never engage in the culture of silk.

In the second place it will increase the population of the State. The liberal provisions of the law will have an irresistable tendency to call in silk growers and manufacturers from States that pursue a more penurious policy. These emigrants will be found of a very different character from those from the "Emerald Isle." They will bring with them a spirit of industry and enterprise—habits of temperance and economy, and a love of morality and good order—they will cheerfully contribute their proportions of money for the support of the government, and deposite their influence in the common stock in support of the laws and institutions of the State.

THE HESSIAN FLY SUPPOSED TO HAVE EXISTED IN FRANCE.

To the Editor of the Farmers' Register.

A few days ago, I accidentally found an extract, which, twenty years ago I had made from an agricultural work which I happened to open. It is as follows:

"There is a small kind of worm, which gets into the roots, chiefly of oats, and, working upwards, destroys all the inside of the plant, which perishes soon after. I suspect it to have been an insect of this kind that destroyed so much wheat in the neighborhood of Geneva, and which M. de Chateau-vieux describes thus: 'Our wheat, in the month of May, 1755, sustained a loss, which, even that cultivated according to the new husbandry, did not escape. We found in it many little white worms, which afterwards became of a chesnut color. They post themselves between the blades, and eat the stems. They are usually found between the first joint and the roots. Every stalk which they attacked, grew no more, but became yellow, and withered. The same misfortune happened to us in the year 1732. These insects appeared about the middle of May, and made such havoc, that the crop was almost destroyed.'"

[*Duhamel's Husbandry, page* 86.

Now, sir, was this insect the Hessian fly? If it clearly was not, please throw this communication into the fire. But if it is either certain, or probable that it was, the publication of my extract may be valuable. In the first place, it seems to me important to preserve every fact illustrating the history of this scourge of American agriculture. To ascertain and record facts as to the history, nature, and habits of this insect, would probably afford to some inquiring mind, a hint which might lead to the discovery of some means for its extirpation. But, in the second place, if the Geneva insect be the Hessian fly, should not our intelligent agriculturists seek for a more full and detailed account of the facts stated by M. de Chateau-vieux? Might not such an inquiry result in bringing to light the usual modes of agriculture, or the special means used on those occasions, by virtue of which, the visits of the insect in question were so promptly arrested? Could not the Editor of the Farmers' Register avail himself of his correspondence with French agriculturists to gain this information? Or, if that correspondence is not yet sufficiently general, might not the distinguished Virginian who represented our country at the French court, and who has in the inquiry, not only the general interest of an American patriot, but the more special and personal interest of an Albemarle farmer—might not he institute that inquiry with as bright a prospect of success as would be open to any one at this late day? If in this way the interests of American agriculture

could be promoted, it would doubtless gratify him highly thus to benefit his country.

A. B.

Although it was long the prevailing (and scarcely questioned) opinion, that the Hessian fly was of European origin, and was first brought to America in the straw beds of the Hessian soldiers employed in the revolutionary war, that opinion seems to have yielded to one entirely opposed, namely, that this insect was altogether unknown in Europe. This last opinion seems sustained by strong indirect testimony, in this respect, that if the fly existed in Europe at all, its ravages would certainly have been heard of, and to great extent—whereas, no such evil is mentioned by authors, among the many to which the wheat crop is usually suoject. This objection to the existence of the fly in Europe is not removed by the quotation furnished by our correspondent: but it must be admitted that the description agrees so closely with that of the Hessian fly, that if taken alone, there could be but little doubt as to its being the insect there described. The passage is at least curious and interesting—though it had escaped our observation in a former perusal of this work, and, also, probably the observation of other farmers, and has been first noticed by our correspondent, who has no practical acquaintance with farming.

But though we shall rejoice to have agricultural inquiry in general extended, and consider the exchange of information between this country and Europe especially wanted, it is not believed that any inquiry as to the disappearance of this insect could lead to any valuable result—or that it could compare in importance with hundreds of other matters on which information might be obtained, but for the want of suitable intercourse. The plagues of different insects have prevailed to great extent, at many times, and have afterwards ceased, as suddenly, and as unaccountably, as they first arose and spread. Such a case occurred in the alarming numbers and ravages of the chinch bug, some dozen years ago in part of Virginia, which, by their increase, threatened destruction to the crops of both corn and wheat—but which disappeared after two or three years. Another case is presented in the next succeeding page of the work which our correspondent quotes from, in a passage which shows very clearly, (notwithstanding the ignorance of facts, or false reasoning displayed,) that the common *moth-weevil* of Virginia was once very destructive to wheat in France. Yet that insect is not known at most times as a cause of injury in Europe; and within the last two years, the same scourge has again appeared, and seems to be considered (under the name of *alucite des grains)* as a new foe to agriculture —and the investigations of agricultural societies, and their offers of premiums, have been directed to obtain knowledge of the habits, and to stay the ravages of this insect. Seeing that the description, in recent French papers, agreed fully with the moth-weevil, and believing that the articles on that insect in vol. I. of the Farmers' Register, were both correct and convincing, as to its propagation, and the means of preventing its ravages, we attempted to convey these papers to the Central and Royal Agricultural Society of France: but whether they were never received, or were deemed of no importance, there has been no notice taken of them in the proceedings of that Society. But this is a digression from what was designed—which was to copy from Duhamel the evidence that moth-weevil, formerly existed in France, and was very destructive. The passage which follows, is part of a letter to Mr. Duhamel, from a gentleman of Angoumois.

"'The great loss, which we have suffered in this "province in our corn, and especially our wheat, for "seventeen or eighteen years past, has put us upon "making strict inquiries into the causes of a corrup- "tion with which our grain is infected. The common "opinion is, that when the corn is in bloom, that is to "say in the month of June, small white butterflies lay "their eggs in the flowers. When the grain is ripe, "the eggs are enclosed in it. As soon as the corn is "laid up to be kept, it is found to ferment. This fer- "mentation raises a heat, which hatches the eggs, "whence little worms proceed, which are transformed "into chrysalides, and these are afterwards metamor- "phosed into little gray butterflies, or moths. In this "state they quit the grain, which is then void of flower. "This insect not only spoils the grain in which it is hatch- "ed, but likewise communicates a most disagreeable "smell to all the grain near it; a smell which is sometimes "so strong and nauseous, that fowls, and even hogs, "will not eat the grain.

"Others impute it to the maize, or Turkey wheat, "which is sown in great quantities in this province, "and which spreads its roots so far, and so impover- "ishes the earth, that other corn sown after it, in the "same ground, can find no nourishment. This is not "probable: for it could only alter the quality of the "grain, but not bring on an entire putrefaction.—The "two following experiments were tried to prevent "it.

"A farmer had three or four acres of land which "had been under grass for more than sixty years. He "had ploughed and dunged it well. He had his seed "from Poitou; and, in short, took every precaution to "guard against this contagion. The wheat ripened "and was very good. He cut it down in a dry sea- "son, thrashed it in the open air, and cleansed and win- "nowed it very carefully. It was laid in a granary "which had no communication with any other, and "which had an opening to the north. The farmer or- "dered it not to be laid above three inches thick on the "floor, and to be turned twice a day. Four days passed "before the least heat was perceived; but on the fifth "day, it began to grow a little warm; and from that "time the heat increased, notwithstanding every means "that had been, and still continued to be used. All "that could be done, was, to prevent its being so much "spoilt as corn in general was that year.

"The other experiment snceeeded better. As soon "as the wheat was thrashed, well cleaned and win- "nowed, it was put into an oven heated to a certain "degree. The floor of the oven was covered with "wicker hurdles, on which the corn was spread four "inches thick: the door of the oven was then shut, "and remained twenty-four hours without being "opened. Many have followed this example. Their "grain has not changed: only its color is not so "bright. Care must be taken that the oven be not too "hot: otherwise, the bread made of this flour will have "a burnt taste. It is likewise necessary to cover the "bottom of the oven, lest the wheat should comunicate "its taste to it.

"I confess that this operation is long and trouble- "some, where a great quantity of corn is to be pre- "served; for only ten or twelve bushels can be put in- "to the oven at a time: and besides, it must be done "the moment it is thrashed; otherwise it will infallibly "spoil.'"

Extracts from the Philadelphia Agricultural Memoirs.

WOOLLEN RAGS AS MANURE.

"The roots of plants naturally possess to a considerable degree the power of producing decomposition, as I have had occasion more than once to observe in the case of planting potatoes with woollen rags instead of dung. I have seen fine crops of potatoes raised by dropping a small piece of woollen rag not larger than the hand, in the furrow along with every set of the potatoes when planted; and I have observed, when the potatoes were gathered in the fall, that in every instance where a potatoe plant had failed to vegetate, the rag was turned up entire, very little damaged by being buried under ground; whereas on the other hand, not the smallest vestige of the rags were to be seen in any part of the ground where the plants had succeeded and grown to perfection."

"Before the revolution war, I collected many cart loads of tailor's rags, chiefly woollen. Some I had cut in small pieces; others were ploughed in as they came from the shops, after having been scattered by hand so as barely to cover the surface of about three acres of loamy land, much worn. I had a remarkably fine crop of potatoes, succeeded by a great crop of wheat. On this clover was sown. It lay for many years without other manure except plaster, in green grass after the clover. The effect of the rags continued longer than that of any manure I ever experienced.

From the Farmer's Magazine.

ON DRILLING CORN [OR WHEAT.]

Letter from Mr. CHECKETTS of Belgrave-Hall, near Leicester, to the Right Honorable SIR JOHN SINCLAIR, Bart.

February, 1821.

SIR: IN answer to your letter, I am happy to inform yon of my success in drilling. If I were to deviate from this system, I could not withstand the bad times that the farmers now experience. I drill every kind of grain; and have drilled Swedish turnips, for the last five years, on ridges, in the manner you pointed out; but, owing to the late dry summers, I have been under the necessity of working the ridges down to a flat surface with my horse-hoe which keeps the moisture from evaporating more than the high ridges. The greatest weight I ever grew with the drill on ridges was twenty five tons per acre; and at the same time, in the same field, broadcast, fifteen tons to the acre. About the time I last wrote to you, my neighbours were beginning to follow my system of drilling.

At the present time, every farmer near me drills his corn, (rows from five to seven inches,) even those that were prejudiced against the system before they tried it.

The man whom I set up with a drill, continues to go from village to village with the drill, to many different farmers, to drill their corn, by the acre. The third year he said he would sell it, for every village at which he drilled, the wheelwrights and blacksmiths were taking patterns from the drill, for the purpose of making others; and that he should meet with no employ the year ensuing. I desired him not to sell it, for that showed him the system was gaining ground, and he would meet with plenty of fresh customers, which was the case; and this last year was his best. He drills wheat, barley, and oats, from five to seven inches asunder, at two shillings per acre; beans, peas, &c. at twelve inches, at one shilling per acre; the farmers finding a horse, and a boy to lead.

I have at this time an enclosed piece of strong clay land, of four acres, in a high state of cultivation, that has been alternately wheat and vetches for ten years. It joins my farm-yard; and I believe I could not put it to a better purpose. The vetches are always carted into the farm-yard in a green state, for the farm-horses and others; at the same time keeping the yard littered with stubble, or what I can spare for that purpose. The wheat and vetches are always drilled, and well hoed in March and April. The wheat I always harrow, and hoe in thirty bushels of soot per acre. In the year 1820 it was wheat; and the four acres produced four loads of wheat in the sheaf to the acre, each sheaf one yard round at the band; each load 10 threaves of 24 sheaves to the threave; and each threave produced one bushel;—which is five quarters to the acre. The four acres are at this time drilled with vetches, and in spring will undergo the former process; and as each land is cleared of the vetches in summer, it will be ploughed up to prepare for wheat.

I have at this time a great quantity of soot in a good dry shed, for which I gave 5s. per quarter. It gains strength by keeping in a great bulk; moreover, it sells for 8s. a quarter in the spring. This is a sufficient inducement to lay in a stock in the autumn and winter.

I grow the small Heligoland beans in preference to the large sort. They are tougher in the stem, snd will allow the horse and hand-hoe to be worked better amongst them. They also produce more quarters per acre, are harvested sooner, and allow the land to be sooner ploughed up for wheat; which is a great advantage for the ensuing crop. I was successful last year in growing Talavera wheat; drilled the latter end of Febuary, after Swedish turnips drawn off to the grass land,—a great and good crop, full six quarters to the acre. In December, 1818, I drilled Talavera wheat after Swedish turnips. I had upon this an amazing crop of straw, seven feet high, and little good corn. I now sow the Talavera wheat on my weakest and dryest soils.

I employ ten regular labourers on my farm. I allow them, according to their families, a proportion of land (that I intend drilling wheat on at Michaelmas), upon which they grow potatoes enough for their winter consumption. The potatoes are planted in drills, in the same manner as turnips on ridges. It is a pleasant scene of industry to behold the men, their wives and children, on the day of planting: Every one gets his potatoes cut for that day; the double shieldboard plough opens the ridges; the carts bring the manure; all flock to assist in depositing it; all join to help each other to drop the potatoes on the manure; the men follow with a large hand hoe to cover it and the potatoes; they thus proceed to another lot of ground, till all is finished. This is a great assistance to them; for in this village, garden land is scarce. When the potatoes grow high enough to be seen; a narrow walking horse, or pony, works the horse-hoe between the rows, to clean and pulverize the

soil; and the hand hoe follows, to clean in the rows between each plant. After a time, the clogs are put on the shares of the horse-hoe, to mould them up with the fresh soil. I know of no way so cleanly and good to grow this useful and valuable root; and under this system the land is kept clean from weeds, and well pulverized, and will produce a good crop of wheat equal to a dead fallow.

I never knew a farmer leave off drilling who placed his rows near enough together, and allowed plenty of seed to the acre.

There is no machine deserves encouragement more than the drill, for many reasons. It encourages industry; it grows a greater quantity of corn to the acre, of better quality; it employs the poor in the spring, and the extra produce of the crop pays them; no weeds are allowed to seed and fall to the ground, nor to grow so as to impoverish the land. I am certainly of opinion that one crop of weeds exhausts the land more than, or equal to, three crops of white straw.

The price I pay for hand-hoeing is 4s. per acre for wheat, 3s. 6d. for barley and oats, and 6s. for beans; the wider in the rows, the more it is worth for hoeing. The hoes cost 2d. an inch.

To encourage the drill against broadcast, I have offered the farmers to divide a field of clay land into two equal parts, and that I would drill in the crop and hoe it at my own expense; and that I would have nothing but the extra produce for my trouble and expense. My offer has never been accepted. I have therefore never had the pleasure of a trial, except on my own farm, which is good wheat land; and, on the average, produces one quarter to the acre more than broadcast.

I am, &c.

THOS. CHECKETTS.

ON THE VALUE, AND MODE OF CONSTRUCTION, OF MUD WALLS, FOR FARM BUILDINGS AND ENCLOSURES.

To the Editor of the Farmers' Register.

Surry, Va., May 31, 1836.

I believe no one has given to your very valuable publication, any account of the mode of constructing mud walls for fences and houses; and as I am at this time constructing half a dozen houses with such walls, for negro quarters, upon the place of my present residence, and having also seen much of this kind of building, I have thought that a short sketch of the plan of such houses, the mode of constructing them, together with some account of the results of experiments made some eight or ten years since in this kind of structure, might serve to call the attention of the public to it, as something novel indeed in this country, but at the same time as affording for permanent enclosure, in the absence of ordinary materials, one of the cheapest and most durable substitutes; and for farm houses perhaps the very best material that can be found to fulfil at the same time all the conditions of fitness, durability, cheapness, and appearance. I will premise, however, that I am not going to speak of *pisé* or *dirt walls*, of which the public have heard so much. Mr. Herbemont of South Carolina, has given in the 1st vol. of the Farmers' Register, a high commendation of *pisé* as a material for constructing houses and fences, but he seems to recommend pisé chiefly for permanent enclosures where wood and stone are either too costly, or not to be had: and the South Carolina "Society for the Diffusion of Useful Knowledge," in the 3d vol. Farmers' Register, No. 8, also recommend pisé as a mode of constructing houses and fences. I shall not pretend to question such high authority—still less should I be inclined to add any thing to the much that has been written upon pisè, a mode of building which is said to have its origin traceable back to the days of Rome and Greece, and which is said in the address of the South Carolina Society, above alluded to, to "be "the subject of a full article in a work of great au- "thority, the *Cours Complet d' Agriculture*, by the "Abbé Rozier, assisted by some of the most scien- "tific men in Europe," and by Mr. Herbemont himself, that "there is a full description of the "manner of building pisé houses and walls, to be "found in one of the volumes of the American "Farmer of Baltimore, and in Rees' Cyclopædia. "It may also be probably found in several other "books." I have mentioned these authorities upon the subject of pisé, chiefly that the subject may be the more readily investigated by those who desire to compare it with what I shall call *mud walls*, and I would invite this comparison, especially by those who have read Mr. Herbemont's article in the Register above referred to; because I think he has there, in his zeal for pisé, opposed the influence of his name too hastily to the introduction of the more simple and humble, but not the less useful system of "mud walls," when he says, "this mode of building (*pisé*) must not be "confounded with what are called 'mud houses,' "and which are inferior in every respect"—if indeed Mr. Herbemont meant here to refer to the kind of mud wall which I shall describe.

I have been unable to ascertain the origin of the mud wall mode of building. Rees' Cyclopœdia is silent upon the subject, with the exception of the following remark under the head of "Walls." "Rammed earth walls, as well as those formed of "muddy clay, answer very well in some intentions, "being very close, compact and warm." Loudon in his "Cyclopœdia of Cottage, Farm, and Villa Architecture, &c." p. 77, gives the mode of building the mud walls of cottages in Cambridgeshire, England, but this process is totally different from the one I shall describe. General John H. Cocke of this State, constructed the first mud walls for houses and enclosures which I have ever seen or heard of in this country, and in answer to some inquiries lately made of him upon this subject, he writes: "I know of no person in our country who "has built mud walls but myself. It was not an "original conception of mine, it having been in use "for centuries in Europe. I was put upon it from "reading of it in agricultural and rural economy "books; and finding a Welshman in my neighbor- "hood, 15 or 16 years ago, who had been accus- "tomed to making walls of that description in "Wales, I made my first experiment with his as- "sistance, shortly after that time, upon a farm "yard wall, which is now as firm as it was the day "it was put up." So you see, Mr. Editor, I shall be unable to attribute to my mud walls the antiquity of Greece or Rome, or to recommend them to the public notice by citing any learned treatises upon them by learned men. I regret indeed that they have no such aid, for I verily believe they merit this last as much as pisé—or if they

have any such aid, that my ignorance renders me unable to adduce it. But be all this as it may, I will now proceed to state the *results of some experiments* with mud walls for houses and fences, and then explain the *mode of construction*, so that an intelligent public may judge if there be really any thing valuable in this mode of building, and that those who choose to practice it, may have the few simple rules required to guide them.

The farm-yard wall mentioned above in the extract from Gen. Cocke's letter, forms three sides of the enclosure of a barn yard upon the Bremo estate. It was put up about the year 1820 or 1821, is based upon a rough stone foundation without mortar, or upon what is called dry masonry—the foundation wall being about 20 inches wide, and rising 6 inches above the surface of the earth. The wall is about 7 feet high, and covered with common pine slabs nailed upon a rough frame in the form of a roof. This wall is perhaps more perfect than it was when first put up, having become harder with the lapse of time. I have never known a mud wall built without a stone or brick foundation, but I am decidedly of opinion, that one would stand well without any such expensive aid, if built upon a tolerably dry locality, nor do I think the wood capping or covering by any means *essential* to that degree of preservation which simple utility (and not appearance,) would require. I state these *opinions*, however, rather to shew my conviction of the durability of this kind of wall, than from any desire to have them acted upon. In truth, I have in this instance given my opinion when I had only intended to state facts. I hope they will not be confounded. Gen. Cocke has also a stable and a quarter at Bremo with mud walls, which have been standing several years, and are found to answer every expectation. He has also enclosed a lot and house in the village of Charlottesville with a mud wall, which has been standing eight or ten years without injury.

Upon my four plantations in the county of Brunswick, there are upwards of thirty mud houses, (each double 19 by 30 feet, with a stone chimney in the middle,) for negro quarters, besides overseer's houses of larger size. These houses are however all plastered on the outside with lime mortar. The first of them were built about eight years ago, the others successively added until they were all completed about the year 1832. None of these houses have since required any repair—the walls promising to stand as long as the roofs are kept upon them. They constitute, I venture to say, the handsomest improvement in the way of farm houses, to be found in the State of Virginia, and cost the estate not the outlay of one cent, except for the trifling article of nails, and have been found to reduce, for several years past, the doctor's bills to a most felicitous *caput mortuum*. In building these houses, a good stone mason belonging to the estate constructed the chimneys and foundations of *stone*, an abundance of which was found at hand; and with his aid and under his direction, the ordinary plantation hands put up the walls, a coarse negro carpenter executing the wood work. Sheer truth and justice, however, require me to state, that all these improvements were made under the eye and superintendence of the very intelligent and enterprising steward of the estate, Mr. Richard D. Powell, according to instructious given him.

A *suitable soil* is a prerequisite to the use of mud walls; any soil, however, will do for this purpose which will make pisé, or brick. A pure clay will do, but this is not so good, being liable to crack in in drying. A soil of clay and sand in proportions of one of the former to two of the latter, is I think the best. But lest some imaginary difficulties might arise here in the minds of some as to the necessary qualities of the soil to be used, I will state it as my belief, resulting from experience, that almost any soil will answer well which will make a good stiff mud, such as is every where known to be used by negroes in daubing or chinking their houses, and which may be found upon most plantations in ninety-nine places out of a hundred.

When a mud wall is to be built, a *foundation* of dry masonry or brick must be previously prepared by any rough mason, rising six inches above the top of the ground, and as deep below as the nature of the soil may require. The foundation wall will usually be 20 inches thick. At a distance of three feet from the outside base of the foundation wall, draw a line parallel to the wall, and throughout its length; lay off six feet from this line and draw another, parallel to it upon the ground. The space included between these two lines is to be spaded up to the depth of 9 inches; and then, after a good rain, or after adding water, hauled if necessary for the purpose, the earth must be worked up into a stiff mortar or mud, by treading it with oxen. This done—which indeed may be considered well done when the mud would be thought half prepared even for coarse bricks—the three men who are required in the operation, each with a spade makes a layer, a *spade full* thick, of the mud upon the *berm*, or margin next the wall. As soon as this is done, one of the men with an arm full of sound *wheat straw*, begins at one end of the layer and spreads the straw before him upon the mud, walking upon it as he passes along, and having it just thick enough to prevent the mud sticking to his feet as he passes on. A second layer of mud is next piled upon the straw, then a layer of straw, then mud, &c. until the mud first prepared is laid in a pile upon the berm, with the straw distributed through its mass in the manner just described. The next operation is to commence the wall. For this purpose, two men are provided each with the common manure fork of iron with three prongs, and a handle of four or five feet. One of these men stands upon the pile of mud, the other upon the wall—the first with his fork places the mud upon the wall in reach of the man there, who with his fork takes it up and throws it strongly into its place. This process is continued until the wall is raised about *three* feet, and extended some three or four feet in length, when another man with a common spade, ground to an edge, cuts off the mud which overhangs the foundation wall, making the corners of the wall square and plumb, and the sides plane. Should it be desired to give the wall a smooth surface, a second trimming with the spade would be advisable after it has had time to dry a day or two, when it would be found to trim much more evenly; and the man who trims should be guided by a *plumb and straight edge*.

The first course of the wall being thus finished, it must be left a few days to dry, and become hard enough to bear the superstructure. In the mean time, the mud may be prepared in the same place and as before, and the process thus continued until

the required height is attained, raising the wall at each layer about *three feet*. Some little experience will be required, to teach the proper degree of stiffness to be given to the mud to prevent its slipping when first put upon the wall, and that it may be cut easily by the spade.

My quarters are, I think, of a good size, and of an economical form—each roof covering two tenements; these last having each an interior space of 16 by 13 feet; a brick chimney in the middle giving a fire-place to each room. The houses are generally placed with their gables to the east and west, with a door to the south, and windows in the north side, the better to exclude the sun and let in the air in summer. They are placed on a street 100 feet wide, and the houses upon the same side of the street 60 or 70 feet apart, as a security against the progress of fire. They have all plank floors, which certainly contribute to health when a marl floor cannot be had. All my houses are plastered on the outside, but I am perfectly satisfied that this is unnecessary except for appearance sake; and perhaps whitewash occasionally applied would be all that is necessary even to secure a good appearance. In putting the roof upon a mud wall, a plate of timber 5 by 20 inches should be first placed upon the wall, properly framed at the corners, upon which the joists are to be placed, and then the roof constructed as usual, taking care to have an eave of about 1 foot projection. The door and window frames are made of three inch plank, having the width of the wall; and framed to the proper size. These are placed on as the wall progresses, and the mud built up to them.

PHILIP ST. GEO. COCKE.

Surry, Va., May 31st, 1836.

Extract from the Edinburgh Review, of Jan. 1836.

PROGRESS AND PRESENT STATE OF AGRICULTURE IN GREAT BRITAIN.

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It results from the previous statements—1st, That the population of Great Britain has been considerably more than doubled—that the prodigious number of *nine millions* of individuals have been added to it, in the interval between 1755, or 1760 and 1831. 2d, That the supplies of corn, and other raw produce obtained from Ireland, are quite insufficient to provide for the increased number of horses kept in the country at present, over and above those that were kept in 1760. 3d, That the population is now, and has been for some years past, incomparably better fed, consuming a much greater quantity of wheaten bread and of butchers' meat, in proportion to its amount, than in 1760, or at any other period of our history. And 4th, That the ports have been shut during the last four years: and that consequently, the vast additions made to the population, and the signally improved mode of living, have both been provided for by the extension and improvement of British agriculture. There is not one of these propositions liable to either cavil or dispute—they are all bottomed upon unquestionable evidence. And, having established them, we shall now briefly inquire into the nature and influence of the more prominent of those agricultural improvements, the result of which is, in the aggregate, so astonishingly great.

1. Enclosures are, probably, entitled to rank amongst the first of these. The extent of land occupied by wastes, commons, and common fields, about the middle of last century, was surprisingly great, and was, indeed, a standing reproach to the country. So late as 1770, fully three-fourths of the surface of Bedfordshire consisted of common fields, and of common or waste land, and yet it was not, in this respect, at all in a worse condition than many other counties. Wastes and commons are not cultivated; fields are, it is true, subjected to the plough, but property in them is so much subdivided and intermixed, that it is altogether impossible to cultivate them to any good purpose. But since the conclusion of the treaty of Paris in 1763, a wonderful progress has been made in wiping off the stain on the rural economy of the country; and in nothing, indeed, has the progress of improvement been more remarkable than in this particular. The first enclosure act was passed in the reign of Charles II. From the revolution to 1797, the progress was as follows:

	Acts passed.	Acres enclosed.
Queen Anne's reign,	2	1,439
George I., - - -	16	17,660
George II., - - -	226	318,778
George III. to 1797,	1,532	2,804,197

It appears from this statement, which is taken from the Report of the 'Commons' Committee of 1798, on Waste Lands,' that each enclosure act that passed during that period of the reign of George III., which terminated with 1797, enclosed at an average, 1830 acres. Now, the official returns show that from 1798 to 1832, both inclusive, 2103 enclosure acts were passed; and supposing each to have enclosed, as before, 1830 acres, the total would amount to 3,848,490 acres; making when added to the quantity enclosed previously to 1798, an aggregate of no less than 6,652,687 acres enclosed since the accession of George III. in 1760. But as it seems probable that the earlier acts applied to a larger extent of land than the later ones, we may, perhaps, estimate the total extent of land enclosed and subdivided by act of Parliament, from 1760 to 1832, at 6,000,000 acres. And it may be safely affirmed, that, in consequence of its enclosure, the produce of this immense extent of land has been increased at least from *eight to tenfold*.

2. The instoduction of falllows between successive corn crops, was a very great improvement on the previous practice; but the substitution of green crops for fallow, on all but stiff clay lands, has been the greatest of all improvements ever made in agriculture: and has effected as great and beneficial a revolution in it as the introduction of the steam-engine and of the spinning-frame has done in manufactures. There is abundant evidence to show, that the culture of turnip, as a field crop, was carried on to some extent in several English counties, in the latter part of the 17th century. But the practice spread only by very slow degrees; and it was not till its introduction into the county of Norfolk, in the reigns of George I. and George II., when it was prosecuted on a large scale by Lord Viscount Townshend and others, that its signal importance became obvious. At the period referred to, the whole northwestern part of that county, which has long been one of the best cultivated districts of the empire, consisted of mere sandy wastes, sheep-walks and warrens, worth

little or nothing. These were converted into highly productive arable land, by enclosing, marling, and the aid of turnip-husbandry, which is, as it were, the corner stone of the Norfolk, or improved system of husbandry. The same practices that had produced such splendid results in Norfolk —that had made sandy wastes yield the most luxuriant crops of wheat and barley—have been gradually extended, with similar effects, to many other parts of the kingdom. The produce in corn of the light soils, in all the moderately well-cultivated districts of the empire has, in consequence, been more than trebled; at the same time that a vast supply of green-food has been obtained for the feeding of cattle and sheep, and the production of the most valuable manure.

3. But signal as has been the improvement in arable husbandry since 1760, the improvements made in stock-husbandry, or in the breeding and fattening of cattle, have been still more considerable. No efforts for this purpose seem to have been made with judgment, and proper perseverance, till after 1750, when Mr. Bakewell, of Dishley, in Leicestershire, began his career. Mr. Culley, of Northumberland, soon after entered on the same course; and the signal success by which their efforts were attended, roused a spirit of emulation in a host of others. But the rapid increase of manufactures and commerce, and, consequently, of the town population, after the peace of Paris, in 1763, by creating a corresponding demand for butchers' meat, gave the principal stimulus to the improvements that have since been made in stock-husbandry. It is not easy to over-rate their importance. We have already seen that, at an average, the weight of cattle and sheep has been a good deal more than doubled since about 1750; so that a stock of 5,000,000 head of cattle, at present, would be more than equal to one of 10,000,000 at that epoch. But the number, as well as the weight of cattle, having been very materially increased in the interval, the supply of butchers' meat must have increased in a corresponding proportion, or been at least trebled. There has also, owing to the same cause, been a very great increase in the product of wool. The supply of the latter article, produced in England and Wales, in 1800, was estimated at about 384,000 packs, of 240 lbs. each. But owing to the increased size of the animal, and the greater weight of the fleece, the same number of sheep that produced 384,000 packs in 1800, were estimated by the best informed wool-growers and wool-staplers, to produce 463,000 in 1830, being an increase, in the interval, of no less than 20 per cent.* It is true that the quality of the wool has rather deteriorated, for it seems to be impossible to procure both a heavy and a fine fleece. Taking, however, the increased weight of the carcass, and the increased weight of the fleece into account, sheep are believed to be more profitable at present, than at any former period; and for the last three or four years, they have been the most productive species of stock kept in the kingdom.

It would be curious to trace how, in husbandry, as in other things, one improvement grows out of, and is dependent on another. The grand improvement in modern agriculture—that by which it is mainly distinguished from the old—the universal introduction and superior management of green crops, may be in no considerable degree ascribed to the anxiety of the farmers to procure an abundant and suitable supply of food for their stock, the increased demand for the latter being as already stated, occasioned by the wonderful growth of commerce and manufactures.

The superior attention paid to stock husbandry, in England may, also, it is probable, be to some extent ascribable to the circumstances of the Tithe pressing with comparative lightness on pasture land; whilst it falls with its full weight, on arable land, and operates powerfully to prevent the outlay of capital upon it. But however accounted for, there can be no doubt, that in all that belongs to the breeding and and rearing of cattle, horses, sheep, and pigs, the English are, at present, superior to the Scotch, and to every other people.

It may be worth while to remark, that much injury has arisen from injudicious attempts to improve native breeds of cattle. This has generally been occasioned by prematurely endeavoring to increase their size, which is always determined by external causes, such as the climate, the quantity and species of food the animals can readily obtain. &c. It is to the immensely increased supply and better quality of food, that the increased weight of our cattle is principally to be ascribed. An improved system of breeding would have improved the symmetry of the cattle, and increased their aptitude to fatten; but, without an increase of food it would not have materially added to their size. In point of fact, too, the latter is an inferior consideration. The grand object that the prudent agriculturist should keep steadily in view is the obtaining of the greatest possible return for his outlay; and he will prefer that kind of stock, and that breed, of any kind, that will pay him best for the food consumed. The value to which an animal may ultimately be brought, is a subordinate consideration; the profits of breeding, as of every thing else, being determined, not by the absolute price of the produce, but by its price as compared with the expenses incurred in bringing it to market. Mr. Culley's opinion is, that of all animals, of whatever kind, those which have the smallest, cleanest, and finest bones, are in general the best proportioned, and covered with the best and finest grained meat; I believe they are, also, the hardest and healthiest, and most inclinable to feed; able to bear the most fatigue, while living; and worth the most per pound, dead.* It is certain that animals, whether too large or two small, will gradually accommodate themselves to the size best adapted to their pastures; but while the larger animal becomes unhealthy, and degenerates in its form and valuable properties, the smaller animal increases in size, and improves in every respect.

The preceding remarks apply exclusively to England and Wales. But though the progress of agriculture there, since the middle of last century, has been exceedingly rapid, it has been slow compared to its progess in Scotland. Previously to the peace of Paris, in 1763, agriculture, almost every where in Scotland, was in the most barbarous and depressed state imaginable. There was no rotation of crops; fallows were unknown, ex-

* Mr. Luccock's Tables, revised by Mr. Hubbard. See the Report of 1829, on the Wool Trade.

* Observations on Live Stock, p. 222.

cept to one or two counties; the process and implements were alike wretched: great numbers of cattle perished every spring; the occupiers were in extreme poverty: and famines were every now and then occurring, that sometime laid waste extensive districts. At the beginning of last century, and for long after, lands, even in the Lothians, were uniformly divided into *infield* and *outfield*. The whole manure made on the farm was laid on the former, which was ploughed and cropped without intermission, so long, at least, as it would bear any thing. Neither turnips, clover, nor potatoes had been so much as heard of; but corn followed corn in an unbroken series. In the *Countryman's Rudiments*, written by Lord Belhaven, and publish-in 1723, we are told that the infield of East Lothian, where wheat is sown, is generally divided by the tenant into four divisions, or breaks, as they call them, viz. one of wheat, one of barley, one of peas, and one of oats; so that the wheat is sown after the peas, the barley after the wheat, and the oats after the barley. Here we have a rotation with three consecutive corn crops, and a crop of peas once every four years. As might be expected, the returns were about *three times the seed*. It is of importance, too, to observe, that this trifling return, was obtained at a great comparative expense. At this period, and for about half a century after, there was no instance in Scotland of a plough being drawn by fewer than four horses. Most commonly it was wrought either by six horses, or by four horses and two oxen; and in some of the most backward districts, a still greater number of animals, sometimes as many as ten or twelve, were yoked to it. This was ascribable partly to the awkward and clumsy form of the implement itself; partly to the weakness of the cattle, their diminutive size, and the improper manner in which they were yoked; and principally perhaps, to the ignorance of the cultivators. On the whole, however, the work was at once very expensive and very ill performed; the ridges were crooked and twisted, and so much heaped up in the middle, that a great deal of land in the hollows between them was lost to any useful purpose.*

About the middle of the century we begin to find symptoms of amendment. In Maxwell's *Practical Husbandry*, published in 1756, an improved system is laid down and inculcated. He pronounces it to be bad husbandry to take two consecutive corn crops; and he informs us, that the best farmers in East Lothian after fallow take a crop of wheat, after the wheat, peas, then barley, and after that oats. This is still very bad; though a material improvement on the practice described by Lord Belhaven. It shows, too, that down to 1757, neither turnips, potatoes, nor any sort of cultivated herbage, formed any part of the system even of the best farmers in East Lothian. The famous Lord Stair is said to have been the first who introduced the turnip culture into Scotland; having raised turnips on his estate of New Liston, near Edinburgh, about the middle of last century. But Mr. William Dawson, tenant of Frogden, in Roxburghshire, has an unquestionable title to be considered as the real father of the improved Scottish husbandry. Being a farmer, and cultivating for profit only, his example had infinitely more influence over his neighbors than it would have had, had he been a landlord. He commenced raising turnips at Frogden, in 1759. They were at first sown broad-cast, but he set about drilling on a large scale in 1763, and his success stimulated others to adopt the same system. Mr. Dawson was also the first who introduced, not long after 1760, the practice of ploughing with two horses abreast without a driver; nor is it easy to exaggerate the obligations the agriculture of Scotland owes to his sagacity and enterprise.* But even in the Lothians, the four-horse plough continued in general use till about 1780; and it was not finally superseded by the two-horse plough for several years after. In the other parts of the country the former kept its footing still longer than in the Lothians. Nothing contributed more to pave the way for this important revolution in the method of ploughing, than the signal improvements made upon the construction of the plough by Small about 1770.

From the close of the American war, the progress of improvement in Scotland has been rapid beyond all previous example. This has been owing to a variety of causes; but principally to the extraordinary progress made in commerce and manufactures, since that period. In the distracted state in which Scotland was formerly placed, there could be no considerable progress; but, after the battle of Culloden had extinguished the hopes of the Jacobites, and the abolition of hereditary jurisdictions had paved the way for the introduction of a regular system of government, a spirit of industry and enterprise began to be diffused on all sides. A good many branches of trade and manufacture carried on in England were introduced into Scotland soon after the peace of 1763; and not a few of them were prosecuted with much success. Their progress was checked for a while by the American war; but after the treaty of Paris, in 1783, they acquired more than their former vigor: others were introduced, and all of them have since continued, with few, and those but transient interruptions, to advance with a rapidity that could not previously have been supposed possible.

This unprecedented extension of manufacturing and commercial industry, occasioned a corresponding increase of wealth and population, particularly in towns and villages. Improved accommodations of all sorts began to be in universal demand; and, besides the greater quantity of the inferior sorts of food required to supply the increasing population, a novel, or at least a vastly increased market was opened for wheat and butcher meat. These circumstances had the most astonishing influence over agriculture. The new, and constantly increasing markets, established at their very doors, stimulated the farmers to put forth all their energies, and to avail themselves of discoveries and practices to which they had hitherto been total strangers. In a few years the face of the country was completely changed; and its productive capacities increased in a degree that the most sanguine projector of any previous period could not have conceived possible.

The following statement of the comparative weight of the produce annually afforded under the system of farming followed in East Lothian,

* Rural Recollections, p. 196.

* Survey of Roxburgh, pp. 69 and 90.

as described by Lord Belhaven, and that which is now followed, is taken from a paper by Mr. Oliver of Lochend, near Edinburgh, one of the most intelligent practical farmers in the empire.

'The mode of cropping at the former period (1723) was first, peas; second, wheat; third, barley; fourth, oats; the produce being about three seeds, but to prevent all cavil, say four seeds. This, taking the seed for each acre* at one boll,† over a farm of 100 acres, is 400 bolls. The quantity of straw for each boll of such a crop could not exceed fifteen stones; which, on 400 bolls, give 6000 stones, or forty-two tons, fifteen and one-fourth cwt. of straw to be consumed by the stock, and returned to the land in the shape of manure. But, upon a farm of 100 acres, cultivated as at present, viz. a fourth turnips, a fourth wheat or barley, a fourth clover or rye-grass, pastured or made into hay, and consumed on the spot, and a fourth oats or wheat, the account would stand thus:—fifty acres of wheat, barley, and oats, at eight bolls an acre, which is not above the average of the crops of the best district of East Lothian, and such only was cultivated when Lord Belhaven wrote; this, allowing, as before, fifteen stones of straw for each boll, gives 120 stones per acre, which, over fifty acres, makes in all 6000 stones of straw, being equal to the quantity produced by the whole 100 acres under the old system. Now, suppose that the twenty-five acres of clover and rye-grass are made into hay, which, however, is not the best mode, nor that usually followed, and that each acre yields 200 stones, the total quantity will be 5000 stones, or thirty-five tons, fourteen and one-tenth cwt., and add to this 500 tons turnip, being the produce of twenty-five acres at twenty tons per acre, which is by no means above a fair average crop. Upon these data, the weight of the materials produced annually, as food for cattle and manure, under the old and new systems, will be as follows·—

Old System,	Straw,	6,000 st. or	42 tons	15 1-4 cwt.
New System,	Straw,	6,000	42	15 1-4
	Hay,	5,000	35	14 1-10th.
	Turnips,	70,000	500	

'Thus making the weight of materials for food and manure under the new system, in round numbers, 577 tons, while, under the old system the quantity is only 42 tons, leaving a balance in favor of the new of 533 per annum, being more than *twelve times* the whole quantity produced under the old! Nothing more is necessary to show the superiority of the new system, in so far as keeping up the fertility of the soil is concerned; and upon this depends the progress of agriculture. As to the question of comparative profit, it would be easy to show, from unquestionable data, that the new system is superior to the old in this respect, as it is in the supply of manure; but this must be abundantly obvious to every one who contrasts the almost imperceptible advances made in agriculture, and the accumulation of agricultural capital, for many centuries, with the extraordinary progress during the last fifty or sixty years, or since the new system began to be introduced.'

We have thus endeavored, first, to show, by the increase of population and otherwise, that there must have been a very extraordinary increase in the produce of the soil since 1760; and, in the second place, we have endeavored to point out the more prominent of the modes in which this increase has been brought about. But, before noticing the present state of agriculture, it may be right to say a few words in reference to a statement often made, though really destitute of any good foundation; that is that the wonderful improvements to which we have adverted, were almost wholly owing to the high prices of the late war. But these improvements began both in England and Scotland about 1755 or 1760, and they had been generally introduced, and had made a great progress, before prices sustained the smallest advance. Thus, we have already seen, that no fewer than 2,804,000 acres were enclosed in England and Wales between 1760 and 1797; that that also was the era of the great improvements made in stock husbandry by Bakewell, Culley, &c.; and that during the lapse of the same period, the culture of turnips, potatoes, clover, and artificial grasses was introduced into Scotland, four-horse ploughs discarded, and the most signal revolution effected in the rural economy of this part of the empire of which history has preserved any account. Now, it is of the utmost importance to bear in mind, that, while all this was going on, *from* 1760 *down to* 1795, *prices continued almost stationary*. Thus, taking the Eton market for a standard, the price of wheat, per Winchester quarter, from 1755 to 1795, was as follows:

At an average of ten years, from		
1755 to 1765, wheat	£1 19 3 1-4	per quarter.
1765 to 1775, wheat	2 11 3 3-4	per quarter.
1775 to 1785,	2 7 8 1-2	do.
1785 to 1795,	2 14 3 3-4*	do.

And had 1795 which was an extremely bad and dear year, been excepted from the average of the last decennial period, prices in it would have been as low as in the preceding. It appears, therefore, from evidence, which is beyond all question, that there was no rise of prices during the thirty years ending with 1795; and yet during that period, above 2,200,000 individuals were added to the population, and agriculture made an astonishing progress. This would have proved conclusively, even though it had not been corroborated by the experience of the last twenty years, that an increasing price of corn is not in any respect indispensable to ensure the continued and rapid advance of agriculture. All that is required to ensure this, is a regularly *increasing demand* for the products of the soil; and this was afforded between 1760 and 1795 by the growth of population, especially in towns and villages. It should also be remembered that, towards the middle of last century, there was, owing the miserable state of the roads, and the difficulty of communication, a great difference in the prices of corn and other farm produce in different parts of the country. But the construction of new and comparatively smooth and level roads, canals, &c., did much to annihilate this difference in the rate of prices; and conferred on the more distant parts of the country advantages that had been hitherto engrossed by the districts in the immediate vicinity of large towns. A spirit of emulation and improvement was in consequence universally diffused; routine practices were thrown aside; and all classes began to make the most astonishing efforts to outstrip each other in the career of improvement.

* The Scotch acre, equal to 1.261 imperial acres, is here referred to.

† An East Lothian boll of wheat is equal to near four bushels; a boll of barley to near six bushels.

* See Table of Prices at Eton, in M'Culloch's *Commercial Dictionary*, Art. "Corn."

It is unnecessary for our purpose to enter into any statements with respect to the causes of the high prices that prevailod during the greater part of the late war; and, particularly, during the half dozen years ending with 1814. They no doubt gave a powerful stimulus to agriculture; its previous progress being not merely maintained, but considerably accelerated.

The heavy fall of prices that took place consequently to the opening of a renewed intercourse with the continent in the autumn of 1814, was as sudden and severe as it was unlooked for by most persons. In the first instance, it was productive of much distress, of the ruin of many landlords in embarrassed circumstances, and of multitudes of tenants paying money rents, calculated on the footing that the prices that had been realized during the proceding six years would be permanent. This, however, was not the situation of the great body of the agriculturists, by whom the fall was comparatively little felt. It was, indeed, supposed by many, that agriculture would certainly retrograde; that a great deal of inferior land would be thrown out of cultivation; and that, unless prices rose again to something like the war level, we should be dependent on the Continent and America for a large portion of our supplies. We question whether any individual had sagacity at the outset to foresee what has actually taken place. There is an elasticity about the industry of a great nation that enables it to recover from the rudest shocks. No inconsiderable portion—we believe we may safely say the greater part—of the wonderful progress made in manufactures and commerce since 1814, is clearly ascribable to the subsequent fall in the price of corn and other articles of food. Bnt it is quite impossible that agriculture can be long depressed, where manufactures and commerce are flourishing; and, in no very lengthened period, it began to revive. The property-tax, which pressed heavily on the land, was struck off; rents were reduced; and the farmers exerted themselves to meet the new order of things by fresh efforts of skill and industry, and by proscribing useless expense. We do not pretend to say that this has been the case in all districts; but there is incontestible evidence to prove, that, taking Great Britain generally, agriculture has been astonishingly improved since 1814. How else could the extraordinary increase of population that has taken place in the interval be provided for? We showed, in an article on the 'Report of the Agricultural Committee of 1833' (No. 118, Art. 1,) that there was either no increase, or none worth mentioning, in the quantity of foreign corn retained for home consumption during the ten years ending with 1830, as compared with the previous ten years; and yet the population increased during that interval from 14,391,000 to 16,539,000. Now, it is impossible that a result of this sort could have taken place without either a very great increase of agricultural produce, or a striking and almost unprecedented falling off in the demand for corn. But the latter supposition is out of question. Instead of there being any decline in the consumption, the statements previously made show, that the fact is completely the reverse; and that the consumption of wheat and butcher's meat is decidedly greater at this moment than at any former period; a result inexplicable on any other hypothesis, save that of a vast improvement having taken place between 1820 and 1830.

Still, however, the Agricultural Committee of 1833, and by far the greater number of witnesses examined before it, labored hard to prove that agriculture was in a depressed and declining state; that the capital applied to the soil was rapidly diminishing; and that a great diminution of supply might be confidently expected. We endeavored to show, in the article referred to, that the complaints in question were certainly very much exaggerated, if not altogether unfounded. The experience of the two additional years that have since elapsed has more than verified our statements. The increase of population in Great Britain from 1800 down to 1830, has been at the rate of about 15 per cent each ten years; or of 1 1-2 per cent per annum. A rate of this sort is not easily changed, and there is no reason to think that it has been sensibly affected since 1830. Now, 1 1-2 per cent on the population of 16,539,000 (population of Great Britain at last census,) gives an annual increase of no less than 248,000 individuals; so that it may be concluded, that there are at present (January, 1836) about 1,200,000 persons in Great Britain more than were in it when the late census was taken; and about 500,000 more than when the Committee of 1833 framed their Report. And yet very little foreign corn was imported in 1832, whilst in 1833, 1834, and 1835, the ports were all but hermetically sealed to the foreigner. It is of importance, too, to observe, that, notwithstanding the sinister auguries of the Committee, and notwithstanding the greatly increased demand for corn, evinced by the rapid increase of population, the supply has been increased in a still greater ratio. This is evident from the decline of prices, which have sunk from 58s. 8d. in 1832, to less than 38s. at present!

This wonderful result, so different from was expected, is partially, no doubt, a consequence of the unusually productive harvests of the last two years; but it is ascribable, in a far greater degree, to the influence of improvements. With the exception of some counties in the south and west of England, which continue in a comparatively stationary state, improvements have been every where carried on with extraordinary spirit. Among the principal of these may be specified improved drainage, a better rotation of crops, the general use of bone manure, and the opening of new channels of communication by steam-boats and otherwise. Drainage lies at the bottom of almost every amelioration; and it is prosecuted to an extraordinary extent, with surprising success. The practice of furrow draining is now widely diffused over the north and east of England; and it has been introduced, within the last half dozen years, into this part of the country, and is carried on upon a scale that will hardly be believed by those not acquainted with the facts. Landlords and tenants are every where availing themselves of this new discovery. Perhaps, however, Ayrshire, is at present, in this respect at the head of every county in the empire. It has a great deal of wet, clayey soil, suitable for this employment; and so well is its value understood, that many millions of drain tiles are now annually manufactured in the neighborhood of Kilmarnock and other parts of the county, though this supply be still unequal to the demand. The Duke of Portland and some

other landlords drain for their tenants on their paying an extra rent of 4s. and 5s. an acre; and this is said to be decidedly under the additional value given by the drainage to the land. The practice is rapidly extending in Lanarkshire, Dumfriesshire, and other Scotch counties, and has already had, and, no doubt, will continue to have, an astonishing influence over their productive capacities.

A better rotation of crops is also every where in the course of being adopted. The high prices of the war tempted the farmers to sow wheat too frequently, and without proper preparation; the fertility of the soil being, in consequence, materially impaired in many districts. This was particularly the case in the Lothians. But this defect in the management is now nearly obviated. Clover and artificial grasses are kept longer down; barley is sometimes substituted for wheat. The fertility of the soil is preserved; and taking even the best of the old improved land, it now produces, at an average, a larger amount of food.

But of all the recent improvements in agriculture, the introduction and general use of bone manure is perhaps the most important. It first began to be employed on a large scale in Yorkshire and Lincolnshire; and, in the latter particularly, its influence has been all but miraculous. Most part of the Wolds of Lincolnshire, an extensive tract of country, stretching from Spilsbury north to Barton on the Humber, consisted, when Arthur Young wrote his survey of the county, of mere wastes, occupied by rabbit warrens. Could he now revisit the Wolds, he would hardly recognize a single feature of their former state. The warrens have disappeared, and in their stead we find some of the finest farms and best managed land in England. This signal improvement, though it did not begin, has been carried to its present pitch of perfection by the use of bone manure. We are informed, in the late elaborate report of the Doncaster Agricultural Association on this manure, that before bones were generally used with turnip-seed, many thousand acres (in the Wolds of Lincolnshire and Yorkshire) were annually sown for that crop without any manure whatever, from the impossibility of getting fold manure for more than a third or a fourth part of their fallows. The turnips upon such unmanured land were consequently very indifferent; and the benefit of such feeding upon their tops, for bottoms they seldom had any, was very trifling. Since the use of bones has, however, become general, the turnip crop, has been in many instances *ten-fold*, and in few, less than *four* or *five-fold* its former bulk. All the succeeding crops of grain and seeds have been amazingly increased; and, upon the four or five-shift system, there is no doubt, the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power.

This, be it observed, is the testimony of practical men, well acquainted with all the circumstances; and it is decisive as to the extraordinary value and importance of bone manure on light chalky soils. A single farmer in the Wolds of Lincolnshire (Mr. Dawson of Withcall, near Louth,) has generally about 600 acres of turnip, dressed almost entirely with bone manure They are excellent, and furnish a vast supply of food for cattle, and of manure for other land, besides preparing and fitting the ground for bearing the most luxuriant crops of wheat and barley.*

In Scotland, the introduction of bone manure is more recent; but here, too. it has already had a suprising influence. It is every where in fact—in the Lothians and Berwickshire, as well as in the most backward districts—working wonders. From the comparative facility with which it is conveyed to rugged hilly tracts, it enables estates to be improved and fertilized that must otherwise have remained in a state of nature. Besides large quantities of bone dust imported, bone mills are now constructed in the vicinity of every considerable town in Scotland, for the preparation of this most valuable manure.

We have previously noticed the influence of new roads, and other improved means of communication, on the progress of improvement, during the first thirty-five years of the reign of George III. But during the last few years, there has been, in this respect, a still more astonishing change. The application of steam to navigation, has given to a voyage by sea the expedition, and almost the certainty, of mail-coach travelling, at comparatily little cost; and steam-packets for the conveyance of bulky and heavy articles, as well as passengers, are now established all along the coast. The markets of London and Liverpool are thus brought, as it were, almost to the door of the occupier in the remotest districts. Formerly, it was the practice for farmers in Scotland to send up cattle and sheep half fed to the Norfolk fairs, where they were bought by graziers to fatten for the metropolis. But this practice is already much fallen off, and will, at no distant period, be known only by report. Cattle and sheep are now fattened at home: and are sent up from the eastern ports, either alive or slaughtered, to London by steam. The advantages of this are great. The crops of turnips acquire a new and greatly increased value, and their culture is, in consequence, much extended. Nor does the cost of conveying the full-fed animal to its destination amount to a fourth part of what it formerly took to convey the half-fed animal to Norfolk. All the ports of any consequence on the western coast of Scotland are now almost weekly visited by steamers from Liverpool; and such has been the influence of this newly opened intercourse, that we are well assured that, in the extensive tract of country, stretching from Greenock round by the Mull of Galloway to the Cumberland border, to the distance of ten or fifteen miles inland, the turnip culture has been increased in a ten-fold proportion since 1820. This stimulus will, it is probable, be still farther augmented by the formation of rail-roads. It is clear indeed, that contiguity to market has already become of comparatively little importance. At no distant period, means will be afforded for bringing the most remote and secluded districts fairly into competition with those that are most favorably situated. The productive energies of both will, in consequence, be more fully developed; nor is it easy to conjecture what the result may be.

It is notwithstanding, supposed by several, that if prices should decline still further, or even if they continue at their present level, production

* Kennedy and Grainger on the Tenancy of Land, vol. i. p. 269.

will be seriously checked. But the previous statements show that there is really nothing to warrant any such concluson. Hitherto, despite the heavy fall of prices, improvements have been prosecuted on the most stupendous scale; and the fair presumption is, speaking generally, that they will continue to be prosecuted even though prices should fall still lower. It is difficult to estimate the influence that necessity and a desire to preserve one's place in society have in making men inventive and economical; or to specify the point at which production will be contracted by a lowering of prices. In 1823 and 1824, when upland or bowed Georgia cotton brought in Liverpool from 6 1-4d. to 10 1-2d. per lb., many of the most intelligent persons, both in this country and in America, were firmly of opinion that the price would not indemnify the planter, and that the production of cotton would certainly decline. This notion was, in fact, at the bottom of the great cotton speculation in 1825. Experience has since shown the utter groundlessness of the opinion; or though the price of cotton has not risen, except now and then, for a short time, during the interval, the exports of cotton wool from the United States, which, in 1824, amounted to 142,369,663 lbs., had increased in 1834 to 384,717,907 lbs., exclusive of a greatly increased quantity used at home.

Of course we do not mean to say that the prices may not fall so low as to check improvement; but certainly there is no evidence to show that they have already touched that point, or even come very near it. It should also be recollected, that, notwithstanding all that has been done, there is still a vast field for agricultural improvement in Britain. We showed in a former article (No. 120, Art. 6,) that it was the opinion of practical men of the highest respectability, and intimately acquainted with the state of agriculture, that the raw produce of the island might be well nigh doubled without any greater proportional expense being incurred in its production. And any one who has ever travelled through the country, or has compared the state of the Lothians, Northumberland, Lincoln, Norfolk, and other well-farmed counties, with very extensive districts in the south and west of England, and with Wales, will be satisfied that the above is any thing but an exaggerated statement. It is singular indeed how very backward many districts are, as compared with others. In numerous counties, four and five horses and two men are still employed to do that which is better done in others by two horses and one man; and in many parts the drill husbandry can hardly be said to be introduced. This shows that we are possessed of vast capacities not yet brought into activity, and that the career of improvement may be continued for an almost indefinite period.

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SLAVERY IN VIRGINIA.

Extract from *Slavery in the United States*—by J. K. PAULDING: being a letter to the author from a farmer of lower Virginia.

Dear Sir—As regards the first query, which relates to "the rights and duties of the slave," I do not know how extensive a view of this branch of the subject is contemplated. In its simplest aspect, as understood and acted on in Virginia, I should say that the slave is entitled to an abundance of good plain food; to coarse but comfortable apparel; to a warm but humble dwelling; to protection when well, and to succor when sick; and, in return, that it is his duty to render to his master all the service he can, consistently with perfect health, and to behave submissively and honestly. Other remarks suggest themselves, but they will be more appropriately introduced under different heads.

2d. "The domestic relations of master and slave." These relations are much misunderstood by many persons to the north, who regard the terms as synonymous with oppressor and oppressed. Nothing can be farther from the fact. The condition of the negroes in this state has been greatly ameliorated. The proprietors were formerly fewer and richer than at present. Distant quarters were often kept up to support the aristocratic mansion. They were rarely visited by their owners; and heartless overseers, frequently changed, were employed to manage them for a share of the crop. These men scourged the land, and sometimes the slaves. Their tenure was but for a year, and of course they made the most of their brief authority. Owing to the influence of our institutions, property has become subdivided, and most persons live on, or near their estates. There are exceptions, to be sure, and particularly among wealthy gentlemen in the towns; but these last are almost all enlightened and humane, and alike liberal to the soil, and to the slave who cultivates it. I could point out some noble instances of patriotic and spirited improvement among them. But to return to the resident proprietors: most of them have been raised on the estates; from the older negroes they have received in infancy numberless acts of kindness; the younger ones have not unfrequently been their playmates, (not the most suitable, I admit,) and much goodwill is thus generated on both sides. In addition to this, most men feel attached to their property; and this attachment is stronger in the case of persons than of things. I know it and feel it. It is true, there are harsh masters; but there are also bad husbands and bad fathers. They are all exceptions to the rule, not the rule itself. Shall we therefore condemn in the gross those relations, and the rights and authority they imply, from their occasional abuse? I could mention many instances of strong attachment on the part of the slave, but will only adduce one or two, of which I have been the object. It became a question whether a faithful servant, bred up with me from boyhood, should give up his master, or his wife and children, to whom he was affectionately attached, and most attentive and kind. The trial was a severe one, but he determined to break those tender ties and remain with me. I left it entirely to his discretion, though I would not, from considerations of interest, have taken for him quadruple the price I should probably have obtained. Fortunately, in the sequel, I was enabled to purchase his family, with the exception of a daughter, happily situated; and nothing but death shall henceforth part them. Were it put to the test, I am convinced that many masters would receive this striking proof of devotion. A gentleman but a day or two since informed me of a similar and even

stronger case, afforded by one of the slaves. As the reward of assiduous and delicate attention to a venerated parent, in her last illness, I proposed to purchase and liberate a healthy and intelligent woman, about thirty years of age, the best nurse, and, in all respects, one of the best servants in the state, of which I was only part owner; but she declined to leave the family, and has been since rather better than free. I shall be excused for stating a ludicrous case I heard of some time ago: A favorite and indulged servant requested his master to sell him to another gentleman. His master refused to do so, but told him he was at perfect liberty to go to the north, if he were not already free enough. After a while he repeated the request; and, on being urged to give an explanation of his singular conduct, told his master that he considered himself consumptive, and would soon die; and he thought Mr. B—— was better able to bear the loss than his master. He was sent to a medicinal spring, and recovered his health, if indeed he had ever lost it, of which his master had been unapprised. It may not be amiss to describe my deportment towards my servants, whom I endeavor to render happy while I make them profitable. I never turn a deaf ear, but listen patently to their communications. I chat familiarly with those who have passed service, or have not begun to render it. With the others I observe a more prudent reserve, but I encourage all to approach me without awe. I hardly ever go to town without having commissions to execute for some of them; and think they prefer to employ me, from a belief that, if their money should not quite hold out, I would add a little to it; which I not unfrequently do, in order to get a better article. The relation between myself and my slaves is decidedly friendly. I keep up pretty exact discipline, mingled with kindness; and hardly ever lose property by thievish, or labor by runaway slaves. I never lock the outer doors of my house. It is done, but done by the servants; and I rarely bestow a thought on the matter. I leave home periodically for two months, and commit the dwelling-house, plate, and other valuables to the servants, without even an enumeration of the articles.

3d. "The duration of the labor of the slave." The day is usually considered long enough. Employment at night is not exacted by me, except to shell corn once a week for their own consumption, and on a few other extraordinary occasions. *The people*, as we generally call them, are required to leave their houses at daybreak, and to work until dark, with the intermission of half an hour to an hour at breakfast, and one to two hours at dinner, according to the season and sort of work. In this respect I suppose our negroes will bear a favorable comparison with any laborers whatever.

4th. "The liberty usually allowed the slave; his holydays and amusements; and the way in which they usually spend their evenings and holydays." They are prohibited from going off the estate without first obtaining leave; though they often transgress, and with impunity; except in flagrant cases. Those who have wives on other plantations, visit them on certain specified nights, and have an allowance of time for going and returning, proportioned to the distance. My negroes are permitted, and indeed encouraged, to raise as many ducks and chickens as they can; to cultivate vegetables for their own use, and a patch of corn for sale: to exercise their trades when they possess one, which many do; to catch muskrats and other animals for the fur or the flesh; to raise bees, and, in fine, to earn an honest penny in any way which chance or their own ingenuity may offer. The modes specified are however, those most commonly resorted to, and enable provident servants to make from five to thirty dollars a piece. The corn is of a different sort from that which I cultivate, and is all bought by me. A great many fowls are raised: I have this year known ten dollars worth sold by one man at one time. One of the chief sources of profit is the fur of the muskrat; for the purpose of catching which the marshes on the estate have been parcelled out and appropriated from time immemorial, and are held by a tenure little short of fee-simple. The negroes are indebted to Nat Turner* and Tappan for a curtailment of some of their privileges. As a sincere friend to the blacks, I much regretted the reckless interference of these persons, on account of the restrictions it has become, or been thought necessary, to impose. Since the exploit of the former hero, they have been forbidden to preach except to their fellow-slaves, the property of the same owner; to have public funerals, unless a white person officiates; or to be taught to read and write. Their funerals formerly gave them great satisfaction, and it was customary here to furnish the relations of the deceased with bacon, spirit, flour, sugar, and butter, with which a grand entertainment, in their way, was got up. We were once much amused by a hearty fellow requesting his mistress to let him have his funeral during his lifetime, when it would do him some good. The waggish request was granted; and, I venture to say, there never was a funeral, the subject of which enjoyed it so much. When permitted, some of our negroes preached with great fluency. I was present a few years since when an Episcopal minister addressed the people, by appointment. On the conclusion of an excellent sermon, a negro preacher rose and thanked the gentleman kindly for his discourse, but frankly told him the congregation "did not understand his *lingo*." He then proceeded himself, with great vehemence and volubility, coining words where they had not been made to his hand, or rather his tongue, and impressing his hearers, doubtless, with a decided opinion of his superiority over his white co-laborer in the field of grace. My brother and I, who own contiguous estates, have lately erected a chapel on the line between them, and have employed an acceptable minister of the Baptist persuasion, to which the negroes almost exclusively belong, to afford them religious instruction. Except as a preparatory step to emancipation, I consider it exceedingly impolitic, even as regards the slaves themselves, to permit them to read and write: "Where ignorance is bliss," "tis folly to be wise." And it is certainly impolitic as regards their masters, on the principle that "knowledge is power." My servants have not as long holydays as those of most other persons. I allow three days at Christmas, and a day at each of three

* The leader of the insurrection in Lower Virginia, in which upwards of a hundred white persons, principally women and children, were massacred in cold blood.

other periods, besids a little time to work their patches, or, if very busy, I sometime prefer to work them myself. Most of the ancient pastimes have been lost in this neighborhood, and religion, mock or real, has succeeded them. The banjo, their national instrument, is known but in name, or in a few of the tunes which have survived. Some of the younger negroes sing and dance. but the evenings and holydays are usually occupied in working, in visiting, and in praying and singing hymns. The primitive customs and sports are, I believe, better preserved farther south, where slaves were brought from Africa long after they ceased to come here.

6th. "The provision usually made for their food and clothing; for those who are too young or too old to labor." My men receive twelve quarts of Indian meal (the abundant and universal allowance in this state,) 7 salted herrings, and 2 lbs. smoked bacon, or 3 lbs· of pork a week; the other hands proportionally less. But, generally speaking, their food is issued daily, with the exception of meal, and consists of fish or bacon for breakfast, and meat, fresh or salted, with vegetables, whenever we can provide them, for dinner; or, for a month or two in the spring, fresh fish cooked with a little bacon. This mode is rather more expensive to me than that of weekly rations, but more comfortable to servants. Superannuated or invalid slaves draw ther provisions regularly once a week; and the moment a child ceases to be nourished by its mother, it receives 8 quarts of meal (more than it can consume,) and ½ lb. of lard. Besides the food furnished by me, nearly all the servants are able to make some addition from their private stores; and there is, among the adults, hardly an instance of one so improvident as not to do it. He must be an unthrifty fellow indeed who cannot realize the wish of the famous Henry IVth in regard to the French peasantry, and enjoy his fowl on Sunday. I always keep on hand, for the use of the negroes, sugar, molasses, &c., which, though not regulaly issued, are applied for on the slightest pretexts, and frequently no pretext at all, and are never refused except in cases of misconduct. In regard to clothing: the men and boys receive a winter coat and trowsers of strong cloth, 3 shirts, a stout pair of shoes and socks, and a pair of summer pantaloons, every year; a hat about every second year, and a great-coat and blanket every third year. Instead of great-coats and hats, the women have large capes to protect the bust in bad weather, and hankerchiefs for the head. The articles furnished are good and serviceable; and, with their own acquisitions, make their appearance decent and respectable. On Sunday they are even fine. The aged and invalid are clad as regularly as the rest, but less substantially. Mothers receive a little raw cotton, in proportion to the number of children, with the privilege of having the yarn, when spun, woven at my expense. I provide them with blankets. Orphans are put with careful women, and treated with tenderness. I am attached to the little slaves, and encourage familiarity among them. Sometimes, when I ride near the quarters, they come running after me with the most whimsical requests, and are rendered happy by the distribution of some little donation. The clothing described is that which is given to the crop hands. Home servants, a numerous class in Virginia, are of course clad in a different and very superior manner. I neglected to mention, in the proper place, that there are on each of my plantations a kitchen, an oven, and one or more cooks; and that each hand is furnished with a tin bucket for his food, which is carried into the field by little negroes, who also supply the laborers with water.

7. "Their treatment when sick." My negroes go or are carried, as soon as they are attacked, to a spacious and well-ventilated hospital, near the mansion-house. They are there received by an attentive nurse, who has an assortment of medicine, additional bed-clothing, and the command of as much light food as she may require, either from the table or the store-room of the proprietor. Wine, sago, rice, and other little comforts appertaining to such an establishment, are always kept on hand. The condition of the sick is much better than that of the poor whites, or free colored people, in the neighborhood.

8. "Their rewards and punishments.' I occasionally bestow little gratuities for good conduct, and particularly after harvest; and hardly ever refuse a favor asked by those who faithfully perform their duty. Vicious and idle servants are punished with stripes, moderately inflicted; to which in the case of theft, is added privation of meat, a severe punishment to those who are never suffered to be without it on any other account. From my limited observation, I think that servants to the north work much harder than our slaves. I was educatad at a college in one of the free states, and, on my return to Virginia, was struck with the contrast. I was astonished at the number of idle domestics, and actually worried my mother, much to my contrition since, to reduce the establishment. I say to my contrition, because, after eighteen years residence in the good Old Dominion, I find myself surrounded by a troop of servants about as numerous as that against which I formerly so loudly exclaimed. While on this subject it may not be amiss to state a case of manumission, which occurred about three years since. My nearest neighbor, a man of immense wealth, owned a favorite servant, a fine fellow, with polished manners and excellent disposition, who reads and writes, and is thoroughly versed in the duties of a butler and housekeeper, in the performance of which he was trusted without limit. This man was, on the death of his master, emancipated, with a legacy of $6,000, besides about $2,000 more which he had been permitted to accumulate, and had deposited with his master, who had given him credit for it. The use that this man, apparently so well qualiged for freedom, and who has had an opportunity of travelling and of judging for himself, makes of his money and his time, is somewhat remarkable. In consequence of his exemplary conduct, he has been permitted to reside in the state, and for very moderate wages occupies the same situation he did in the old establishment; and will probably continue to occupy it as long as he lives. He has no children of his own, but has put a little girl, a relation of his, to school. Except in this instance, and in the purchase of a few plain articles of furniture, his freedom and his money seem not much to have benefited him. A servant of mine, who is intimate with him, thinks he is not as happy as he was before his liberation. Several other servants were freed at the same time, with smaller legacies, but I do not know what has become of them.

I do not regard negro slavery, however mitigated, as a Utopian system, and have not intended so to delineate it. But it exists, and the difficulty of removing it is felt and acknowledged by all save the fanatics, who like "fools, rush in where angels dare not tread." It is pleasing to know that its burdens are not too heavy to be borne. That the treatment of slaves in this state is humane, and even indulgent, may be inferred from the fact of their rapid increase, and great longevity. I believe that, constituted as they are, morally and physically, they are as happy as any peasantry in the world; and I venture to affirm, as the result of my reading and inquiry, that in no country are the laborers so liberally and invariably supplied with bread and meat as are the negro slaves of the United States. However great the dearth of provisions, famine never reaches them.

P. S.—It might have been stated above, that on this estate there are about 160 blacks. With the exception of infants, there has been in eighteen months but one death that I remember, that of a man fully 65 years of age. The bill for medical attendance from the second day of last November, comprising upwards of a year, is less than forty dollars.

THE "JOHN FRANCIS" LETTER.

We have learned that the letter signed "John Francis" from Prince Edward county, which was published in No. 1, was a specimen of what is called in polite language, *hoaxing*—but what some plain speaking men might deem more correctly designated as a lie supported by forgery. The manner in which the deception was practiced, shows that the unknown author possesses a considerable share of the *particular kind of talent* that is necessary for success in sustaining fraud, and making falsehood appear as truth. If he is still young enough to cultivate, and give the proper direction to this talent, we doubt not that he will yet cut a distinguished figure *at the bar*—but whether *before* or *behind it*, we venture not to predict.

From the Arcana of Science and Art, for 1836.

SPONTANEOUS PLANTS.

Few things are more extraordinary than the unusual appearance and developement of certain plants in certain circumstances. Thus after the great fire of London in 1666, the entire surface of the destroyed city was covered with such a vast profusion of a species of a cruciferous plant, the *Sisymbrium irio* of Linnæus, that it was calculated that the whole of the rest of Europe could not contain so many plants of it. It is also known that if a spring of salt water makes its appearance in a spot, even a great distance from the sea, the neighborhood is soon covered with plants peculiar to a maritime locality, which plants, previous to this occurrence, were entire strangers to the country. Again, when a lake happens to dry up, the surface, is immediately usurped by a vegetation which is entirely peculiar, and quite different from that which flourished on its former banks. When certain marshes of Zealand were drained, the *Carex cyperoides* was observed in abundance, and it is known this is not at all a Danish plant, but peculiar to the north of Germany. In a work upon the Useful Mosses by M. de Brebisson, which has been announced for some time, this botanist states that a pond in the neighborhood of Falain having been rendered dry during many weeks in the height of summer, the mud, in drying was immediately and entirely covered, to the extent of many square yards, by a minute, compact, green turf, formed of an imperceptible moss, the *Phaseum axillare*, the stalks of which were so close to each other, that upon a square inch of this new soil, might be counted more than five thousand individuals of this minute plant, which had never previously been observed in the country.

TO MAKE STARCH.

To the Editor of the Farmers' Register.

Through the medium of your valuable paper, I wish to communicate to the household economist, an article of knowledge recently obtained, relative to *starch-making*.

The common tedious process of soaking and rotting the wheat, is subject to many inconveniences, such as the temperature of the weather, the labor of heating and rubbing the grain, and not *least*, the very offensive and unwholesome odor arising from the fermentation; which last, is entirely obviated by the method I would propose for adoption.

Have the wheat first ground in a common corn mill, then sift the bran from the flour, and put them both into separate tubs of water. After the expiration of twenty-four hours, change the water to the bran, and rub it very well, for the superfine starch is obtained chiefly from the particles attached to the bran; then strain the water off through a fine hair sieve into the vessel which contains the flour. This also should be strained through fine muslin, but a small blanket washed nicely is most to be depended on. The water should be changed twice a day, and the vessel set in the sun. This should be continued until there is no yellow appearance in the water; then the starch is perfectly bleached; and when it is well settled, drain off the top, which is of inferior quality, and tie it in a bag to dry. The pure and superfine starch will adhere closely to the bottom of the tub: break it up and put it in dishes to dry. The chief economy of this plan is, that any spoilt flour, unfit for bread, can be converted into the useful article of *starch*.

It must by no means be permitted to ferment, for this would prevent the separation of the two qualities, and can easily be prevented by changing the water as above directed. This process will yield a greater proportion of starch, and of better quality, than can be obtained from the soaked wheat. "———."

ON THE MANAGEMENT OF THE TOBACCO CROP.

[Continued from page 3, vol. IV.]

To the Editor of the Farmers' Register.

30*th May*, 1836.

After an absence of a month from home, I find in your May No. a request, that, in addition to my former remarks on the preparation and management

of tobacco plant beds, I will "furnish all the details of the usual, most laborious, and costly operation of burning patches for tobacco plants."

After raking off the leaves, the whole length of one side of the patch, skids of about 4 inches diameter are laid, and 3 or 4 feet apart. Wood is then laid across about 4 or 5 feet broad, and raised nearly, or quite, three feet high, intermixed with dry wood, and battered to a narrow space at the top, and the leaves thrown on to start the fire, which is kindled at short intervals from one end to the other. When it is burnt down sufficiently low, long green poles (say about 10 feet) with a strong hook at the end, are applied by two men to each log, and it is hauled back another breadth of the fire, or nearly so, hauling back the leaves, and renewing the skids as occasion requires, and piling the wood on, as at first, but dispensing with the dry wood, if you choose, since any wood will burn after the heat becomes strong. This operation goes on till the whole patch is burnt over. When this strong heat is created, it is unwise, if it can be prevented, to let the fire go out till the work is finished; consequently, it is begun many hours before day, and perhaps, kept up till after night comes on again. This is done at the proper season for sowing the seed, say January, February, or March, if the ground is not dry enough before. It is then dug with hoes, taking care to draw them out without turning in the surface of the earth. Work it over and over till it is quite fine. Rake it nicely with hand rakes, and take off the roots which are gathered. Mark it with a stick about four feet between the marks. Something less than a level table spoonful of good clean seed is sufficient for a hundred square yards. Measure half the seed, and mix them well in a liberal quantity of ashes, (say about a quart to the spoonful.) Walk between the marks, sifting the seed through the fingers, from mark to mark, going over the whole patch. Then go over it again upon the marks, reaching half way to the neighboring mark on each side. In these two operations, but half the number of seed should be sown. Then mark across, mix the other half the seed, and go over in like manner. This particularity is not observed by all. The practice, for the most part, is to go over once each way. But when it is recollected that every plant which does not attain a proper size is lost, and, consequently, every part that is sown too thick is thrown away, it will readily occur to the tobacco maker that this little additional pains is well bestowed. It is then trodden close, each hand going sideways, and one governed by the track of another, till the whole is gone over—then cover nicely with naked brush. This process of hauling the fire is very distressing, particularly when the wind shifts, which sometimes makes it necessary to move the fire to another side of the patch. For this reason, as well as because the heat all operates together, I now generally pack it as mentioned in my former number, and burn for immediate sowing. But in this case, it is absolutely necessary to procure a great deal of seasoned wood and brush, to mix with the green, otherwise it will not burn out clear, and of course the land will not be well burnt. It requires more too than upon the plan mentioned in my former number: because, in that case the fire must be put to it when it is quite dry, and of course before the winter begins.

This description is given, Mr. Editor, for those who are novices in the business. And I will here take occasion to repeat to my brother planters, that what I have said, and may say, is not intended for those who know as much or more about it than I do. It was my intention to give some hints about the manner of manuring, hilling, &c., but they will be too late for the present crop. Nevertheless, I will briefly remark, that care should be taken to manure very regularly, so that the crop may be uniform. For the same reason, and others, it is important always to make the hills when the ground is in a moist condition, but not wet, (for no operation should be performed when the soil is at all too wet—it is much worse than hard cropping,) and a hill should never be cut off till there is a plant ready to put into it immediately. Because, if it is cut off before the rain falls, upon which it is planted, a crust is formed, the rays of light and heat are reflected, and the leaves of the plant parched; whereas, the friable surface of the hill freshly cut off, imbibes more freely the atmospheric influence, which communicates more readily with the moisture below, so that you will often find it quite moist in the morning, when that which has a crust on it is dry. If rain falls on it after it is planted, be it so; it is better than before. When the hills are put up with a "season" in them, we cut them off and plant without rain, as fast as the plants are large enough, taking care to draw them in the morning when the dew is on, and keeping them covered with wet bushes, till they are dropped and planted, without allowing them to *fall* (or wither.) The operation of the sun upon the top of the leaf after it is planted, is less injurious than may be imagined by those inexperienced. I last year planted an entire crop on a large plantation, without a "season," and it stood unusually well. Here, let it be remarked, that a plant should not be drawn, if it can be avoided, till it is large enough, and has a good root.

It may sometimes happen, that the hills dry through, so as to make it necessary to cut them off in order to have them made wet by a rain. But this is an evil that ought to be avoided if it can. This happens when the plants are late. For this cause, I have been compelled to put up the hills later than I would wish. And when there is much to be done, I have found it necessary to prepare the land well, lay it in beds with the plough, check it at the proper distance, and leave it in this rough state till it rains, so that the hands will round up 4000 each, per day, before it gets dry, and thereby preserve the season in the hill. Indeed I have, in this way, when the plants had attained a proper size, levelled the surface, clapped it with the hoe, as usual, and planted without hilling. Let it be observed, that the first plant that is put in, stands a better chance to live, than any that is afterwards put in by replanting. And it is all-important to have an even crop, because in all the after operations of topping, suckering and cutting, more business is done at each operation, and of course a larger crop can be managed with the same number of hands.

Referring to the business of burning patches, I have no doubt, as fuel becomes more scarce, other means will be adopted that will effect a still greater saving, particularly by resorting to standing patches, which, as they become older, require less burning. But it will be found that these must be surrounded

by woods, if possible. For the insect tribe which is multiplying upon us at such a prodigious rate, commit much greater ravages in places exposed to the winds, and the grass and weeds in which they take shelter, than in the woods. This growing evil is one cause that drives us to the culture of tobacco for our profits, which would otherwise be derived in much greater measure from wheat. This crop is now the most uncertain of any we make, which was once our principal staple in the country I inhabit.

I should have mentioned above, that every plant should be primed and topped as soon as it is large enough. It is a practice with some planters not to prime at all; but I do not approve of it. This operation requires more judgment than is generally believed; because, it depends upon the strength of the land and the growth of the plant, how high it should be primed, and how many leaves it should be topped to, so as to make the most of it. The best general rule I can advise is, to prime up to the largest and most promising leaf, and top to eight leaves. This will generally be found about six to eight inches above the top of the hill, according to the strength of the land; in poor land, not so much. Where the land is rich, it will bear as many as ten leaves—very rarely more. The top leaf, when it comes to maturity, ought to be as rich as any on the plant: if it is not, it is a proof that it has not been well managed, or that the season has not suited it. Deep cultivation is essential during its growth; but when it is near to maturity, it is sometimes necessary to give it superficial working, as well because it is too large to plough, as because it is wrong to cut the roots when it is about to make itself, and come to the knife. But I sometimes plough when some of the leaves are broken off by the horse, under the belief that more is gained than lost. In this case a stretcher should be used to draw by, instead of the bar.

I may perhaps, in due time, trouble you with some observations upon the process of curing, which may throw some light upon this very important branch of its management, although I must assure you, it is my unfeigned belief, that many modern planters understand it better than I do.

Permit me now to return my thanks to the editor for the handsome compliment bestowed upon me in his last number. I must, however, express my very sincere regret, that the subject upon which I have treated is so little calculated to advance the permanent interest of our exhausted country. It would be far more gratifying to me if I could give encouragement to the business of farming. Let it not be understood by my brother planters that I am altogether inattentive to the improvement of my estate. I did, I must confess, exhaust the tract of land I began with; but I am now comforted with the belief, that each year finds it a little more fertile than it was at the beginning of the last. The profit of the tobacco crop enables me to purchase clover seed and plaster, which I make considerable use of. And a good portion of the fall and winter is employed in collecting leaves, corn stalks, &c., from which I raise as large a mass of manure as possible, till the time arrives for making the necessary preparation for the summer's work. Yet it must be confessed that the tobacco crop costs too much labor to leave as much time as ought to be employed in improvement. The amount of tobacco land which is rich enough without dung, and other circumstances which the judicious cultivator must decide upon, must determine the question how far he is justified in consulting immediate, rather than ultimate profit.

A PLANTER.

COLD WEATHER—FLORIDA SOIL AND "LIMESTONE"—SEA ORE AND OTHER MANURE, &c.

To the Editor of the Farmers' Register.

Old Point Comfort,
June, 2d, 1836.

I am sitting by a cheerful Lehigh coal fire, and do not know how I can better employ my time, than by throwing together, for your journal, a few promiscuous facts and reflections connected with agriculture.

The fact already announced of the comfort of a good fire in June, is, in itself, worthy of record, and forces us to the conclusion, that our climate is undergoing a decided and progressive change. What effect this is to have upon our general agriculture, time alone will develope. Last winter, nearly every orange tree in Florida was destroyed. I saw trees, known to be 40 years old, killed to the ground, and could but admire the philosophic confidence of an old gentleman on the St. John's, nearly 80 years of age, whose grove I visited, and who, when I wished to sympathize with him on his loss, coolly observed, "it can't be helped—if I have good luck, in ten or twelve years, it will be as productive as ever."

I was apprehensive I had noticed a fact in Florida, which might tend, in some degree, to weaken the established theory of the operation of calcareous manures, on soils producing acid plants; in which class the pine has been included.

An attempt had been made, 3 or 4 years ago, to sink a well in the pine woods near Fort King. At the depth of 6 or 8 feet, a stratum of very rich carbonate of lime was found: it was thrown out, and formed an embankment around the mouth of the well, from 1 to 3 feet thick. On this embankment, I discovered a luxuriant growth of young pines, some just emerging from the lime. The natural conclusion was, that the pines received their nutriment from the lime; but I was not disposed to concede the point without further investigation. I returned to the spot the next day, and after a careful examination, discovered that the roots, in every instance. were deeply imbedded in the sand below, and not a solitary fibre was found penetrating the lime.

On another occasion I visited a spot, also in the pine woods, where the lime for the use of the Fort had been burned for two or three successive years. The refuse of the kilns was scattered over a space of about thirty yards square. The young pines were springing plentifully all around the area; but within it, there was not one to be seen. The only growth on it was the worm seed, (*Artemesia Santonicum,*) and this, though most luxuriant, was found no where else in the neighborhood. May not this fact be of importance in directing the application of lime as a manure? for it may turn out, on investigation, that this plant will not thrive on a soil devoid of calcareous matter.

The country about Fort King is called a limestone country. The pine lands, which constitute four-fifths of this region, to all appearances, are very little more than barren sands, producing scarcely any undergrowth but rank grass, and interspersed, in every direction, with what has been called rotten limestone, containing the impression of various marine shells. Pursuing still the inquiry how such immense forests of pine should grow in a soil evidently calcareous, I concluded to analyze it, and to my surprise, found it did not contain one particle of carbonate of lime. This appeared the more extraordinary, as the rotten limestone was all around me in large masses, as well as disintegrated. I then undertook to ascertain what proportion of the carbonate was contained in this rotten limestone; and to my still greater surprise, could not detect the existence of the minutest quantity. I made the analysis with the best muriatic and sulphuric acids; besides, submitting many specimens to an intense heat. The fact is, it was nothing more nor less than an agglutination of silicious and aluminous matter, forming a species of sand stone, and serving as a matrix in which the shells had been deposited. So perfect were their impressions, that no one, for a moment, could have doubted their actual presence; but all traces of lime had entirely disappeared. Whether it had combined with humic acid, or formed some other compound, I cannot undertake to decide.

There is one singular fact, however, in connection with these Florida lands; to all appearances, they are as barren as the lands from the sea shore; yet, for one or two successive years, they yield tolerable crops of corn or cotton.

We have been made fully acquainted, through the Register, with the value of sea ore as a manure. I can bear testimony to all that has been said in its favor. I have employed it to advantage on corn, but with much more success on wheat and oats. My attention was first directed to it three years ago, by finding on the beach bordering my farm, at high-water mark, a luxuriant bunch of wheat, in full head, growing out of a mass of sea ore: there was no soil within ten yards of it. In the spring of 1834, I covered a small part intended for oats and ploughed it in: the oats were harrowed in. They turned out decidedly better than the remainder of the field. There was one particular spot, where the growth was so rank as to be a matter of observation to every one passing. On examining this spot, I found them growing out of a pile of the sea ore which had apparently been thrown up in the operation of harrowing.

About the same time I top-dressed a small strip of wheat with sea ore. The good effects were very soon discernable, and the place could be pointed out, any time before harvest, as far as the wheat could be fairly seen.

I think the best way of applying the sea ore, is fresh from the beach. Its fertilizing property seems to depend chiefly on the saline and gelatinous matter with which it is incorporated, and these are materially changed by its decomposition in the farm yard.

The objection to its use in this neighborhood is, that it makes the wire grass grow. This I conceive to be its highest eulogium; for what will make grass grow, will assuredly make wheat and corn grow.

A great deal has been written, but not enough yet, on the subject of making manure. No part of our country abounds with greater facilities for this purpose, than the tide water region of our State. We have only to say to our cartman, "bring a load of manure," and it is brought; yet how few will ever give this simple order. The excuse is, the hands cannot be spared from the fields, or they are mauling rails, or catching oysters. Now the remedy is a simple one: make your fields smaller, and you will have more leisure for your hands in summer, and fewer rails to maul in winter; or, if you are determined to be an oysterman, then give up farming altogether.

But, says one, "my fields are already so small, I can hardly make corn enough to live on." Now this brings us to the gist of the matter. Make manure, and my life upon it, you will make more corn from one acre, than you did from two before. It can be demonstrated, as plainly as that two and two make four, that the amount of labor bestowed on a twenty acre field to produce sixty barrels of corn, if applied to making manure and manuring ten acres, will, on these ten acres, produce more the first year than the twenty acres did. Now, carry out this principle, and by the time you have manured your remaining shifts, in the same proportion, and to the standard of productiveness attained by the first, you will be enabled to dispense with one half of your original labor, and obtain the same results you did from the whole; because, it is just as easy to plough good land as bad, and a judicious system of cultivation will enable you to keep your land to the point of fertility it has now arrived at, to say nothing of your diminished expenses in team, harness and agricultural implements.

I hear some of my friends say, "Good preaching this, neighbor—but have you practiced what you preach?" I have, and know it to be true. But if you acknowledge the preaching good, it ought to satisfy you, and you should practise it whether I do or not. I have this year manured all my corn land with good stable and farm yard manure. On eleven acres, I spread and ploughed in 400 single cart loads; the remaining sixteen I manured in the hill. These 27 acres received the year before last, a dressing of burned oyster shells at the rate of a hundred bushels to the acre, and were seeded in wheat and clover. I intend, if possible, always to manure every acre I plant in corn. I have never seen any high land too good to be benefited by it.

I am decidedly of opinion, that the best way of covering corn when planted by hand is with the harrow. Besides the advantage of expedition, it gives a good working to the land. But there is still another, paramount to these: it protects the corn from the crows: they do not know where to look for it. Now in the usual way of covering with the hoe or the foot, the hills are distinctly marked; and a crow will march with as much precision from one to another, as a well-drilled soldier. My experience this year has fully satisfied me of this fact. A part of my corn was planted in drills and harrowed; the remainder in squares and covered with a hoe: the first required scarcely any replanting, and I was forced to replant fully one half of the latter. I found a narrow board tied diagonally across the harrow to two of the teeth, a great improvement: it performed the office of a

scraper, and greatly facilitated the operation of covering.

I have used for eight years past an ox-cart, which, for its simplicity, convenience and economy, I can safely and confidently recommend. The body or frame consists of two well seasoned oak rails, about three inches thick and six wide, coupled together by four cross bars, as in the ordinary cart, and mortised through the flat side of the rails: the sides, which consist of boards of the desired width, are supported by three moveable stancheons on each side of the cart, confined each by two staples, the lower one driven into and near the bottom edge of the rail, and the other, in form of a clamp let into the top edge and securely nailed or screwed down. These stancheons are so formed, as to give a considerable spread above to the sides of the cart. The sides are kept from slipping backwards and forwards, by *batons* corresponding to the position of the stancheons, and the front and tail-boards slide between batons, nailed on the inner face of the sides, and thus prevent the sides from falling in. The bottom is moveable, and formed of boards batoned together, the batons corresponding with the cross bars of the body, to prevent slipping back or forth. The description, I think, is sufficiently explicit to a general understanding of the plan. Should any of your correspondents wish a more detailed account, I will furnish it with pleasure. I have had one of these carts in constant use for four years, without any repairs, and to all appearance it is as good as ever.

The advantages of this cart, besides its cheapness, is, that you may dispense with that part of it which is not immediately required: for instance, in hauling wood or rails, you take off the sides and bottom, leaving only the stancheons: this is a considerable advantage, for all are aware of the serious injury done to the sides and bottom of a cart by pitching wood into it: and I am sure my oxen have thanked me a thousand times for relieving them of this unnecessary weight; and in hauling straw or hay, you unship the stancheons and in their stead use poles. R. ARCHER.

We owe thanks to the writer for this letter of scraps, each one of which is interesting or useful. As to the supposed change of our climate, we have no faith in it, as either general or progressive. The observations and novel facts as to the non-calcareous nature of what has been universally termed *limestone* of Florida, are to us particularly interesting. We have heretofore been much puzzled by the accounts of pine forests growing on soil evidently and highly calcareous—a state of things which our doctrines as to calcareous manures and soils, would pronounce to be impossible. But not knowing the facts, we could not undertake to deny what was so confidently and generally asserted—and could only, in silence, await their further developement. Our correspondent, if judging merely by the eye, and by generally existing opinions, might well have added his testimony to that of all previous travellers; but by resorting to an easy chemical test, he was enabled to pronounce safely that neither the "limestone soil" or the "limestone rock," was in the slightest degree calcareous. If we could have similar observations and actual tests applied to the *agricultural* parts of all the books of travels that either learned or literary men have written, it would be found that they had been disseminating and establishing much more error than truth. No traveller yet has paid any attention to, even if one has possessed any knowledge of, the chemical composition of soils, and their consequent fitness or unfitness for particular productions, and particular modes of treatment: and for such a one, there are mines of useful discovery and of knowledge yet to open, in scientific and practical agricultural research.

RECENT AND CURIOUS FACTS AND QUESTIONS, RESPECTING PLASTER BEDS IN NEW YORK.

To the Editor of the Farmers' Register.

Geneseo, N. Y., June 3, 1836.

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I refer you to a copy of a communication I have just made to professor Silliman. Can you clear away the fog which you will perceive surrounds us? Is it possible that the simple operation of pulverizing will add ten-fold to the efficacy of your shell-marl?

* * * * * * * *

An additional fact in relation to the fertilizing quality of lime seems to be rendered very probable, if not certain, by some experiments which have been recently made in this town. A Mr. Moore, in digging a well, hit upon a formation of soft or friable limestone combined with fossil shells of great diversity of formation. Specimens were sent in different directions, and there was but one opinion, among those who tested them, that it was a limestone formation. A bed of gypsum is very valuable. Mr. Moore and his neighbors appeared determined to believe that they had discovered a valuable gypsum formation on their farms. They sent waggon loads to plaster mills, and grist mills, and caused, what they pronounced gypsum, to be spread on a great number of fields, during last fall and this spring. The result has been, in every instance, that the clover, wheat and spring crops have been essentially benefited by the application; and Mr. Moore and his neighbors still believe the substance which they are selling as gypsum, surpasses in efficacy either the Wheatland or the Cayuga plaster. That this formation is equally efficacious with the plaster which is generally used in this section of the State, there seems no reason to doubt; and that it is a limestone formation, is beyond the possibility of a doubt.

Is it possible that the mechanical operation of grinding or pulverizing crude or unburnt limestone, renders it equally fertilizing with gypsum? It appears difficult to avoid this inference. Mr. Moore has erected a windmill—is digging and vending what he calls plaster in great quantities; and the farmers, from hundreds of experiments, entertain the most entire confidence in its efficacy.

With a view of obtaining some additional facts on this subject, which, in its present stage, is a little perplexing, a person called on Mr. Moore with a vial of muriatic acid in his pocket. Mr. Moore showed him specimens of Chillenango, Cayuga, Phelpstown and Wheatland plaster—each of these

specimens effervesced on the application of the acid. This fact seems to add to the perplexity of the subject, and would appear to indicate that we are using (and certainly deriving great benefit from the use) a certain description of limestone, but which is not gypsum. If this is a fact, it goes to confirm the idea, that limestone, in a pulverized state is equally fertilizing as gypsum.

The subject is important to the farming interest, and certainly merits further investigation. It would not be difficult to erect machinery which would crush the hardest limestone and prepare it for grinding in a common plaster mill.

The facts presented above, and the questions growing out of them, are curious and interesting, and well worthy of the investigation which it is hoped will be bestowed on them. But although it seems sufficiently proved (supposing the specimens to have been fairly selected) that the plaster of N. York (or what is called plaster) generally has a natural admixture of carbonate of lime, it cannot be possible that it is wholly of the carbonate—or that it is *not* gypsum, but a limestone formation. It is sufficiently remarkable if the admixture of carbonate of lime, if in considerable proportion, should to this time have escaped the observation, not only of the plaster dealers, and of the intelligent agriculturists, but also of the chemists and geologists who have examined this extensive and valuable formation. The doubts suggested on this head, will, doubtless, serve to bring forward early and satisfactory explanations. The description given of the substance sold by Mr. Moore for plaster, in addition to the test of the acid applied producing effervescence, leaves no doubt of its being principally composed of carbonate of lime: but with all our confidence in this form of lime, as a manure—and deeming it, when applied in sufficient quantity, far better as an improver, than gypsum—still we cannot believe that it can produce, in such very small quantities as gypsum is given, effects that could be mistaken for those of gypsum—or indeed any effects that would be certainly perceptible. Pulverization would greatly aid the immediate action of shells, or limestone, by enabling every atom to operate at once: but even with all this aid, the effect of sowing a bushel of pulverized limestone, or shell marl, could not be mistaken for that of gypsum. Our inference is, that, Mr. Moore's limestone (or marl) contains a large proportion of gypsum, or of some other fertilizing substance than merely the carbonate of lime.

If we have not misunderstood the words of the private letter which accompanied the foregoing article, the writer had sent the same to the Journal of Science, and in that case, the subject will, doubtless, be properly attended to by Professor Silliman. Though not authorized to use the name of the writer of this communication, we can say that none would be better authority.

MACLURA FOR SILK WORMS.

To the Editor of the Farmers' Register.

In one of your late numbers I noticed an article translated from a French work, giving an account of the discovery that the Maclura, or Osage Orange, is a valuable food for silk worms. I have not the No. of the Register to refer to, but the article, I think, attached great importance to the discovery, and awarded very considerable credit to the dicoverer, claiming both for the credit of France. Now the fact is, this discovery is purely *American*, and was made as long ago as 1829. The *suggestion*, that the Maclura would be proper food for silk worms, was made by Wm. Prince, Esq., of the Linnæan Botanic Garden, Flushing, N. Y., who requested General T. M. Forman of Cecil county, Maryland, to make the experiment. Gen. Forman's letter to Mr. Prince, giving the result of the experiment, was published in the American Farmer, vol. XI. p. 179, August 21, 1829, and I extract from that letter the following.

"*July* 15*th*, 1829.

"From the worms in their earliest stage, after "being hatched, I selected a parcel, and imme- "diately commenced feeding them with the Mac- "lura, while all the others were fed with our na- "tive mulberry with which our country abounds. "Perhaps the Maclura worms were rather better "attended to; if so, it was accidental, and not in- "tentional. I can, however, assure you, that they "grew faster, and completed their cocoons from "ten to fifteen days before the mulberry worms. "* * * * Be assured of this, that if the qual- "ity [of the silk] is equal [to that from the mul- "berry] the Maclura is the plant to cultivate; it "cannot be injured by clipping; the size of the "leaf is a strong recommendation; it is infinitely "the handsomest, and will make the most impen- "etrable hedge, or ornamental standard tree."

General Forman sent the cocoons to Mr. Prince that the quality of the silk might be ascertained, and Mr. Prince sent them to me. I carefully examined them, and found them equal, in all respects, to those made from the mulberry, the silk being equally strong and lustrous. So far, the Maclura seemed fully equal to the mulberry, and in some respects, far superior; but one objection could be found to its use, and that was insurmountable. The Maclura is armed with very strong and exceedingly sharp *thorns*, which render the gathering of the leaves very difficult, and even dangerous.

So much for this great French discovery. It is, however, like many other discoveries made in France and other parts of Europe. They seem extremely loath in the old countries to give the young giant genius of the new that which belongs to it. It is a singular fact, that already the United States have made more improvements in the silk culture and manufacture, than have been made in all Europe for a century, and yet we cannot be said to have *become* a silk producing people. I mean that we, although in the infancy of the business, have out-stripped all Europe in the improvement of it. I will not pretend to describe all our improvements—are they not the burden of all the newspapers in the country? But I will call your attention to one other improvement made in the United States, and also filched from us by France. In 1829, a memoir was read before a learned society in Paris, detailing the discovery that *chlorine* was an effectual preventive and curative of the *tripes* in silk worms (a disease analogous to the plague in the human species.) The memoir set forth various experiments, and extolled the discovery as of immense importance, as it in fact is, and congratulating the silk interest in

France, on their ability, thereafter, effectually to avoid the loss which they had been theretofore annually subjected by that disease. The fact was, that the *discovery* was made by the writer of this article, and published in the American Farmer long before its pretended discovery in France. I had saved my silkworms, and those of several other establishments by the aid of the chloride of lime. I published an account of it in the Farmer, (vol. XI., pp. 124, 383,) and the American Farmer was then regularly received in Paris. The most singular part of this story remains to be told. When the discovery of the Maclura for silkworms, and of the chloride for the tripes, were published here, they were scarcely noticed by the newspaper press; but no sooner did these same discoveries come to us from France, than the whole newspaperpress in the country seized upon them, and sent them to all the ends of the earth.

Excuse me for thus troubling you. I have no other excuse than a desire to see my country possess that which belongs to her. I cannot patiently see her thus filched of her good things.

Yours, &c.,

GIDEON B. SMITH.

For the Farmers' Register.

CLOVER AFTER CORN.

In the early part of July, 1835, when giving my corn its last ploughing, I sowed clover seed on about half an acre, immediately after the ploughing. I did not see the land until September, and then observed that the seed had been sown very irregularly, or had not stood well, if they had been distributed with regularity. Some parts were well covered with plants—but generally they were too thin, and many small spots were bare. I then supposed, and still believe, that the fault was in not sowing regularly. The land was too light for clover—was originally very poor—but had been well marled, manured slightly, and I believe, was afterwards plastered. The place was again observed on June 14, 1836. The clover was of the sapling, or late kind, and was just getting into bloom, and of course had not reached its full growth. Still it was so luxuriant in the best spots as to have been partly lodged by the rains—and though most of the growth in other spots, was inferior, the whole was full as good as I could have expected on the like land, if sown in clover on wheat (as usual) in the early part of 1835, half a year in advance of this sowing.

I was much pleased with this result—supposing it to prove the certainty of getting a good and full crop of clover, the next year after corn; and I determined to sow 20 acres or more of my present corn crop. But my ardor was somewhat moderated by hearing from a very trustworthy and respectable overseer of one of my neighbors, that he also last summer had tried the same experiment, and that though the seed came up well, they nearly all died in August. His sowing was in June—and the seed raked in on half the ground for a better trial—and for both these reasons, I should have supposed, his clover had a better chance to live than mine. But without knowing the cause of the difference of result, I state the facts as I have either seen, or heard them.

If, (as I would have inferred from my own experiment alone,) a good crop of clover could be counted on from this mode, as surely as after wheat, the adoption of the practice would promise considerable advantages to both the three and the four-shift rotations—serving to free both from the strongest objections to which they are now liable. I will now merely allude to some of these, hastily and concisely, and request that they may be considered by any of my brother farmers who will repeat my experiment of sowing clover on corn this summer—as I shall do, and report the success, or the failure, next year.

If the usual three-shift rotation of 1. corn, 2. wheat, 3. clover, could, by adopting this practice, be changed to 1. corn, 2. clover, 3. wheat on clover lay, (or fallow, as it is commonly and improperly termed,) it seems to me that the following benefits would be found.

1. The usual and remarkable superiority of product of the wheat crop upon a good coat of clover, *well turned in*, over that of wheat after corn on the same land, would be gained. This is often equal to 100 per cent.

2. The corn, by following wheat, would probably be less in average product, than if after clover—but probably the diminution would be much less than the gain in the wheat: and this diminution be compensated by the advantages of ploughing clean stubble land, instead of land foul with clover and weeds. The previous growth of wheat, (especially if thick,) would not only clear the land of obstacles to good and easy tillage, but also of the cut-worm and other insects which the clover nourishes, and which are destructive to corn culture in proportion to the prevalence and the success of the improvement by previous clover manuring. One of the greatest recommendations of a crop as the precursor of another in a rotation, is that it destroys the insects that would prey on the succeeding crop. I think that this good effect for corn is produced by its being preceded by wheat—and also to wheat, by its being preceded by a heavy, smothering crop of clover, well and deeply turned in: and that the corn crop does not do any such service to a succeeding crop of wheat—and that clover actually breeds devourers for a succeeding crop of corn.

In the four-shift system, still greater, though different benefits, would be found, by changing any of its present forms to 1. corn, 2. clover, 3. wheat on clover lay, and 4. clover after wheat—and then recommencing the rotation with corn on clover as now practiced, where two years in clover (or clover and weeds) are allowed. But I have already said enough in anticipation of sufficient and satisfactory experiments of the foundation of these plans, namely, making clover to succeed corn.

E. R.

THE SEASON AND STATE OF CROPS.

From all the accounts before us, public and private, it is inferred that the wheat crop throughout Virginia, will fall short of half of an average crop—and that the whole wheat crop of the United States will be not much better than that of Virginia alone. We subjoin, in extracts from private letters, many of the facts that have reached us: but none of these, except the one from Halifax, Va., even refer to the latest and worst calamities, caused by the inundation of most of the

rich and extensive river bottoms of Virginia and North Carolina. The great source of injury to the wheat, and which was anticipated as far back as last October, and expected then to be unusually destructive, was the Hessian fly. In addition to this, and to other minor evils, the very wet season latterly has done great damage, either by filling the soil with water, or entirely overflowing its surface. In the latter part of May, and first half of June, there were 21 days in succession, on which more or less of rain fell—and some of these rains came in floods: and even since the close of this uninterrupted series, there has been an unusual quantity of rain. On high land, the usual estimates of crops expected, vary from one fourth to three fourths of an average. In some fewer cases, they are worse and better than these ordinary extremes, varying from nothing worth reaping, to nearly a fair product. Of the latter cases, very few have been heard of—and those not very lately. From the newspapers, we learn that in Buckingham and the nearest adjacent counties, the wheat was tolerably fair, and near Wheeling, still better: if so, these are the only parts of Virginia as much favored, of which we have heard. On our own farm, we cannot estimate the crop of wheat at more than the fourth of what the land could produce: and where the damage from the fly was the least, and the general growth the best, there the damage was greatest from *scab*, or empty or dead parts of heads. The qnality of the grain will be very bad.

But the rich bottom lands on our rivers have suffered most. These have all been covered by freshets, and to very unusual depths. The Roanoke bottom lands have suffered most. The wheat there is almost entirely destroyed, as well as all other crops—and the soil itself, in many parts, has been carried off by the floods, so that the damage to the land is even of more amount than the entire loss of the year's crops.

Two more days (the 25th and 26th) have passed since the foregoing remarks were written, and on both rain has fallen profusely and heavily; the consequent increase of damage to the wheat will be necessarily great. Where ready for the scythe, it must be much beaten down and tangled by the heavy rain of last night; and where still green, there is danger of the rust coming to destroy much of the quantity and value of the small product previously expected.

June 27th.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

Campbell, May 5th, 1836.

Clover and plaster produce most salutary effects on our lands, and by judicious management, I think will reclaim them at a reasonable expense. Whether they can be made to retain the fertility thus acquired without additional aid, remains to be proven.

Our winter has been severe, and cut deep into the spring, but the warm weather for the last ten days, has pushed vegetation forward with immense rapidity. The mercury stood at 92° last Saturday, and was only a few degrees lower several other days.

Corn is worth $4, fodder, hay and sheaf oats $1 25, and butter 25 cents, and other articles about in the same proportion. Notwithstanding these high prices, there is no appearance of scarcity in the country.

The wheat crop got a good start last fall, and is now promising.

Rockbridge, May 24th, 1836.

We have had delightful weather in all this month (May)—warm and moist enough for grass and wheat, and yet I hear that in many places the latter crop is declining rapidly from the effects of the Hessian fly. The cut-worm, too, is depredating extensively on the young corn, as is almost always the case in grass, and especially clover land, when not broken up in the fall or winter previous to planting.

Albemarle, May 25, 1836.

I regret to state, that the farmers are again likely to experience another disappointment in the product of the growing crop of wheat. Our prospects until the latter part of the winter, were unusually promising. The frequent and severe frosts in the month of March, were very injurious to its growth; it afterwards recovered very much, and at the commencement of the present month, the prospect was flattering; but we were not long permitted to enjoy the pleasing anticipation of reaping an abundant harvest. The ravages of the Hessian fly commenced, and it is believed at no former period have they produced in the same time greater devastation. I also learn that the crop of wheat in the valley counties beyond the ridge, have suffered severely. The weather has been very fine for the last eight or ten days, and I yet hope a great improvement from present appearances may be realised. From the remarkable late and cold spring, our corn crop is very backward. The season of late has been favorable for oats and clover, and both promise well.

Goochland, June 1, 1836.

I regret to say that I am doomed to lose my fourth crop of wheat in succession, (and all I have ever cultivated.) The fly has devoured fully one half of it, and the residue is now threatened with serious injury by the "strut," owing to the heavy rains breaking off the bloom or farina, and preventing the heads from filling. This is poor encouragement for a young farmer. So far my corn and oats are promising, and I trust the tobacco crop will succeed well, for after all, I find that is the only tolerably sure crop with us.

Hanover, June 13, 1836.

This is the first time in upwards of 20 years farming, that I have ever been doubtful whether I would cut wheat that was top-dressed. I have often succeeded well by manuring in that way. We have more cheat than usual, and more than I can well account for on any other supposition than that some came from defective wheat, or wheat injured by the fly.

Charlotte, June 15th, 1836.

We have been completely drenched with rain for something like two weeks—during which time,

but little has been done towards forwarding our crops. The wheat crop in this section of the country, is materially injured by the Hessian fly—many lots totally destroyed. The tobacco crop unpromising—much, very much, has been washed away—no small portion of the crop, especially on the river and smaller water courses, yet to plant—and in consequence of continued rains, our corn crop I fear will be overrun with grass.

Halifax County, June 19th, 1836.

What shall I say to you of the farmer's prospects in this county? Hard rains and swollen water courses have nearly ruined us. The corn on the hills, sobbed by the wet, is small, and sickly, and languishing—on the creek and river bottoms, killed or washed away. The soil is deadened, and seems to withhold its nutriment from the vegetables growing in it. We have but little early corn to re-plant with, and the late cannot come in time. The wheat crop is destroyed on the bottom lands by the freshets; on the hills, it has been attacked by the fly, the rust and the scab. None has escaped all of these enemies—the crop, therefore, will fall to a third of an average one at the highest. In the midst of the desert produced by the fly and the freshets, the oat crop stands as the only oasis, a green spot on which the eye rests with pleasure. But that crop is too chaffy and deficient in grain, to avail us much in warding off famine—and let me tell you, that a very dry season from now out, would come very near producing that horrid calamity. All of our expensive bridges are gone. Banister river was higher by 4 feet than ever known before; carrying away 4 bridges, 2 cotton machines, 2 saw mills, and doing besides, immense mischief in the destruction of crops. I expect you have similar reports from most of your correspondents, and I will not dwell on a picture too old for novelty, and too gloomy for pleasure.

Permit me in conclusion to say to you, that every day furnishes fresh evidence of the great utility of the Farmers' Register. As a farmer and a Virginian, I feel my obligations to you. You have made that a pleasing science which was before a despised art in Virginia. You have dignified the profession of the farmer and its professors. The only reward which a patriot can secure in this country for his labors, is the gratitude and respect of his fellow-citizens. You enjoy these without an exception that I have heard of, and none feels them more, or takes more pleasure in expressing them than myself.

Albemarle, June 15, 1836.

The prospects of our wheat crop in this neighborhood are good upon good land and timely seeding—the late and early seedings being very much injured by fly. My own crop is one of the most promising I have ever had. Much alarm existed at our June court (1st Monday) on account of the open mesh, (or cell,) and certainly then entirely without cause, for the wheat was just in the bloom and that defect can not be perceived. The opening of the mesh and its empty and transparent appearance is the result of a vigorous growth, the germ of the grain being in high condition to receive the fructifying influence of the external bloom, and the grain cup or chaff opens wide to receive it, closing again upon it as soon as the fructification is completed. In every case where a grain forms, this external bloom is detected, deposited upon the germ within the grain cup. The open mesh, or failure of the grain, to form cannot be detected, I think until the period has arrived at which the grain should have formed.

Anne Arundel co. Md. June 6, 1836.

There will not be half a crop of wheat made n this state, and the rye crop is very indifferent. By general consent farmers here will abandon corn-ground wheat.

Matthews County, June 17th, 1836.

The distress produced by the long spell of rainy weather, accompanied with high winds which we have lately experienced in this section of country, is shocking indeed. It is thought, and verily believed, that not one farmer in ten will make seed wheat. The cotton is nearly in whole destroyed—the corn seriously injured, and in fact the entire crops of all descriptions have suffered much. About the latter part of May, I would not have taken less than $500 for my wheat crop; now, I am certain a purchaser of it as it stands, would have a hard bargain at $200. Living on a high land farm, my corn is not as much injured as many others. Under all these disadvantages, we may cheer up our spirits with the expectation of good oat crops, for which, I have never seen better prospects.

From the Genesee Farmer.

STATE OF THE WHEAT CROP IN WESTERN NEW YORK.

The season is now so far advanced that a tolerable conjecture may be formed as to the state of the wheat crop, and the effect produced upon it by the past winter. From our limited observation, and from what we have been able to learn from various authentic sources, it appears that in what is called Western New York, which is emphatically the wheat district of the state, the wheat has suffered to an extent quite equal to what was at first apprehended. The western counties extending to Wayne and Seneca may expect a medium crop—in Wayne, Seneca and Cayuga counties there is much wheat that promises well, but as a whole, it has been a good deal thinned, and many pieces entirely destroyed—while farther east, in Onondaga, Oswego, Madison and Oneida counties, the wheat has suffered still more extensively. In the most favorable sections of Onondaga, where the crops have rarely if ever failed, but few first rate pieces are to be seen; while in the less favorable sections hundreds of acres have been totally destroyed, and have been ploughed up for spring crops. The same remarks, but in a greater extent, are applicable to Madison and Oneida.

For the Farmers' Register.

COMMERCIAL REPORT.

The pressure for money. and high rate of inte

rest which has prevailed for some time in the northern cities, is now gradually diminishing. Considerable relief has been derived from the recommencement of active operations by the U. S. Bank, under its renewed charter as a State institution, and by the establishment of its agencies in Boston, New York, and other places. A considerable sum of money arising from the French indemnity, has also been put into active use, and the distribution of the surplus revenue, will hereafter keep the resources of the country more active.

At this season of the year, the commercial transactions are generally more limited than at any other, and consequently less money is required in regular business; but such large sums have been invested in western lands, city property, rail road and other stocks, that the existing capital of the country appears to be inadequate to meet all the demands on it. The same remark may be applied to the laboring resources of the United States, the insufficiency of which is proved by the very high rates of wages in every branch of employment.

Of our domestic products, tobacco is the one which at this season attracts most attention. The demand for particular sorts has recently improved; say, the low qualities and the choicest for manufacturing, but good qualities for exportation are low compared with last year's prices. The general sales range from $6 to $10. The inspections in Virginia to this time, are less than last year's, but the crop in Kentucky is much greater, and exceeds that of any former year.

Flour has advanced about 50 cents per barrel, and canal brands are now quoted at $6.75. No price is yet named for new wheat—the injury to the crop in most parts of the country, is reported to be great beyond precedent, and so far from furnishing a surplus for exportation, it is apprehended that the crop will prove insufficient to meet the demand for home consumption. The rains which have prevailed with little intermission for a month past, have destroyed a great portion of that which escaped the ravages of the Hessian fly. Such an inundation has not been known for many years past, and the injury or destruction on the low grounds has been immense. Large importations of grain from Europe, have been made for some months past, and supplies from the same quarter will no doubt continue if they can be furnished.

The operarions in cotton have been moderate, with little change in price. A decline in most of the European markets, has not very sensibly affected those in the south and west. Price in Petersburg, 15 to 16½ cents—in New Orleans, 13 to 19 cents.

There has been little variation in the prices of stocks in Virginia. In the northern cities they are advancing as money becomes more plenty.

The extension of rail roads in Virginia and North Carolina, is now in regular progress. All the works required to connect Fredericksburg with Raleigh, are in hand and urged vigorously. Various others are in progress or about to be undertaken. X.

June 25.

Table of Contents of Farmers' Register, No. 3, Vol. IV.

ORIGINAL COMMTNICATIONS.

On the action of gypsum as manure - - 129
On the rail roads of North Carolina, and of the South generally - - - - - - - - 140
Effects of gypsum as manure not lessened by its exposure to the weather - - - - - 146
Observations on housekeeping. The dust remedy - - - - - - - - - 166
A new mode of destroying caterpillars - - 167
The Hessian fly supposed to have existed in France - - - - - - - - - 169
On the value, and mode of construction, of mud walls, for farm buildings and enclosures - 172
The "John Francis" letter - - - - - 183
To make starch - - - - - - - - 183
On the management of tobacco crop - - 183
Cold weather—Florida soils and "limestone"—sea ore &c. - - - - - - - - 185
Recent and curious facts and questions respecting the plaster beds of New York - - 187
Maclura for silk worms - - - - - - 188
Clover after corn - - - - - - - 188
The season, and state of the wheat crop - - 189
Extracts from private correspondence - - 190
Monthly commercial report - - - - 192

SELECTIONS.

Spade husbandry - - - - - - - 130
Orchard grass - - - - - - - 131
To prevent timber from rotting - - - 131
Preserving butter - - - - - - - 132
Demand for cocoons - - - - - - 133
Transplanting evergreens - - - - 133
Spreading stable manure - - - - 133
Two crops at once on the ground - - - 133
Report of of the Connecticut Silk Factory - 133
Explanatory remarks on the action of chemistry on agriculture - - - - - - - 134
Sketch of the agricultural and economical labors of Sir John Sinclair - - - - - 141
Chemical composition of broths - - - 145
Method of destroying mice &c. in their lurking places - - - - - - - - - 145
Report of an experiment in breeding silkworms 146
List of patents issued in October 1835, for agricultural implements &c. - - - - - 151
The culture of asparagus - - - - - 153
Method of ascertaining the richness of milk - 155
On reaping grain at different stages of maturity - - - - - - - - - - 156
Culture of rhubarb - - - - - - 157
Culture of artichokes - - - - - - 158
Culture of sea-kale - - - - - - 159
On drilling wheat; with observations on row culture - - - - - - - - - 161
On the making and curing of butter - - 163
Agricultural establishment at Moegelin in Prussia - - - - - - - - - - 167
Female industry applied to silk culture - - 168
Encouragement of silk culture and manufactures in the Northern States, by legislative bounties - - - - - - - - - 168
Statement of effects of drilling wheat - - 171
Progress and state of agriculture in Great Britain - - - - - - - - - - 174
Slavery in Virginia - - - - - - 180
Spontaneous plants - - - - - - 183
State of the wheat crop in Western New York 191